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The AUTOMOBILE

Motor Traffic in Massachusetts Doubles in 3 Years

Daily Average Has Risen from 96 to 222 Vehicles in Each Subdivision per Day, According to Count Made by State Highway Department

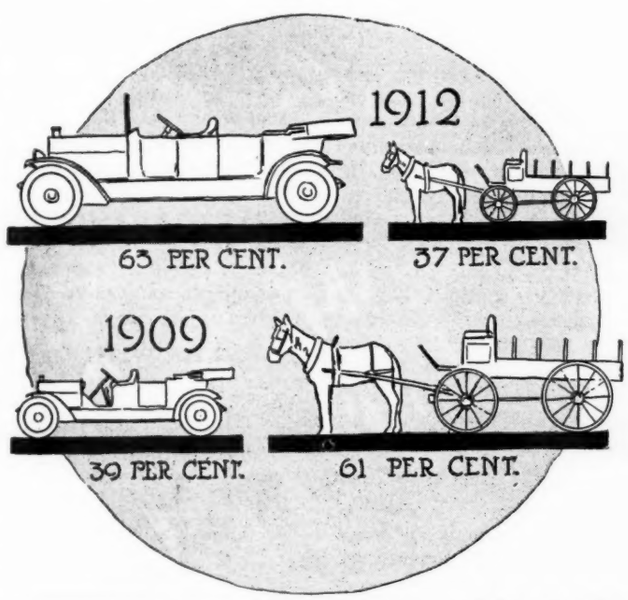
By James E. Sullivan

BOSTON, MASS., Sept. 20.—Motor vehicle traffic on the highways of Massachusetts has increased 121 per cent. in 3 years; in other words, the daily average has risen from 96 to 222 vehicles in each subdivision per day.

These figures are based on a road census made by the Massachusetts Highway Commission extending over a period of 14 days. For these counts the state highway system is divided into a series of observation stations and from 7 a. m. to 9 p. m., daily the count of motor and horse vehicles is carefully taken.

While the number of motor vehicles using the highway has increased at the rate of almost 43 per cent. annually in the last 3 years, horse-vehicle traffic has decreased on an average of 14 per cent., or from 151 to 129 vehicles per day. Light single horse vehicles have decreased 25 per cent., two-horse light vehicles have decreased 14 per cent. and single horse vehicles have decreased 3 per cent. Heavy teams with two or more horses have decreased 5 per cent.

These figures, taken from the annual report of the highway commission, shows that there are now from seventy to seventy-five motor trucks using certain highways daily whereas 3 years ago there were practically none. The figures show that at present touring cars are the greatest users of highways, and of the 34,798 motor vehicles using the Massachusetts highways daily as reported from 157 census stations in 1912, 27,179 are touring cars, whereas there are but 5,819 runabouts and 1,800 motor trucks. Reducing these figures to percentages shows that in the last 3 years the use of touring cars has increased 49 per cent. and that of runabouts 11 per cent.



Comparative diagram showing that the percentage of horse-drawn to motor traffic over the roads of Massachusetts during 3 years has almost exactly reversed positions, the motor now predominating

Turning to the decrease in horse vehicle traffic over the Massachusetts highways, the biggest reductions are seen in single horse vehicles of the light and heavy type which have been reduced practically one-half in case of the light horse vehicle, and 60 per cent. in the single heavy horse vehicle.

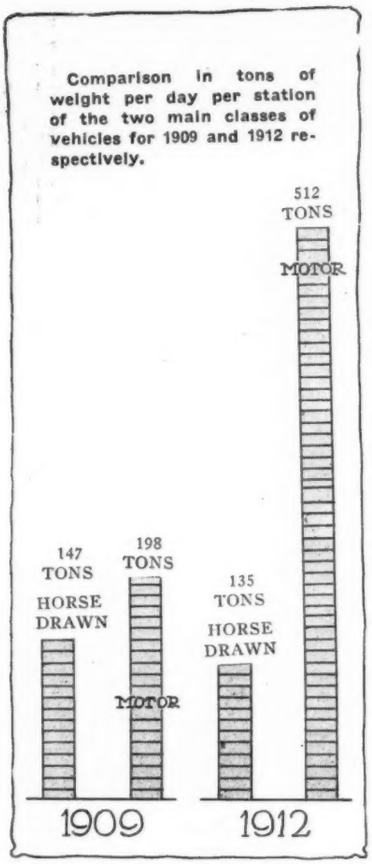
The keynote of this statistical traffic report is well summed up in the commissioner's report which says:

"It is most important to have an accurate knowledge of the traffic which any particular road has to carry.

"The road has to be designed, built and maintained, so that it shall at all times be in proper condition to bear traffic to which it may be subjected, and not only at the least cost to the user, but also at the least ultimate cost to the taxpayer, taking everything into consideration, namely, interest, sinking fund, yearly maintenance and occasional resurfacing.

"Without such knowledge a road-builder is really at sea. He is likely to make serious and costly errors by determining upon the wrong kind of construction, and by selecting improper or unsuitable materials or methods."

In reference to the traffic census taken by the commission, the the report states that, while the 1912 count was taken at eighty-two less stations than that of 1909, it is felt that the percentages of increase and decrease could be safely used to indicate traffic on other similar roads. As a result of the figures obtained by careful observers, and which were carefully compiled, it was shown that the traffic using the roads in Massachusetts was constantly increasing, as in the table on page 544.



Comparison in tons of weight per day per station of the two main classes of vehicles for 1909 and 1912 respectively.

That the motor truck has come to stay is very evident as a resumé of the figures is given. The report states that the factors of road building cannot be grasped until one is familiar with and analyses the truck situation.

It is equally interesting to know that, while in 1909 there were almost no motor trucks, in 1912 there was an average of over eleven per station per day, or about 3 per cent. of the total traffic in numbers and much more in weight. What will it be in future? The increase in motor trucks between the census taken in August and that taken in October was noticeable. The average number of vehicles at each station decreased seventy-two a day or 18 per cent., while the number of motor trucks actually increased 4 per cent.

In one town there was an average of only one truck a day in August while in October there were twenty-seven.

In another town there were twenty-seven a day in August and forty-nine a day in October. One must remember that the average of eleven trucks per day per station is merely an average for the 156 stations all over the state, including country towns as well as cities.

On some state highways near the cities there were often found from fifty to seventy-five trucks a day and usually from fifteen to thirty. On some roads motor trucks constituted more than 16 per cent. of the total number of vehicles and actually outnumbered touring cars. Merely to illustrate, it might be stated that on some of the roads there were 2,100 to 2,400 vehicles daily, and on many there were 800 to 1,000, and yet the average for the whole 156 stations was about 350.

Good Roads Promote Traffic

That good roads are responsible for an increase in travel is shown by the traffic census. For instance, on the road going north from Boston to Maine and New Hampshire summer resorts there was an average of 185 vehicles a day on the new road through Salisbury in 1909. In 1912 it had jumped to 586, an increase in 3 years of 217 per cent. Motor cars had increased from an average of 135 a day to 405 or about 200 per cent., and heavy teams from twenty-five to ninety-seven, or 288 per cent. At the same time, on the route in North Beverly, where the roads were equally good, the increase was thirty-four and seventy-four per cent. The total number at all three points in 1912 was not very different. Salisbury, with a good road, had merely caught up.

The Newburyport turnpike is another good illustration. This was a bad, hilly road in 1909, and although the shortest road between Boston and Newburyport at one station there were only eighty-one vehicles a day. In 1912 at the same point there were 333, an increase of 300 per cent. Motor cars had increased from thirty-four to 249. At another point there was an average of six to seven teams a day in 1909, and six to seven motor cars, or about 13 vehicles a day. In 1912 there were twenty-nine teams and eighty motor cars, or seven times as many. Yet the state had expended but $1,000 a mile improving it, and it is a gravel road of ordinary proportions. Later on this increase will be more noticeable when the conditions become more fully known.

Weight Is Important Consideration

An important consideration is weight, according to the report. Not weight alone, but the vehicle by which it is transported, whether by horse or motor. It is not the tractive power alone that makes the difference, but the tires which support the vehicle; whether iron or rubber comes in contact with the road; whether the vehicle is pulled over the road or propels itself, and thus pulls upon the road surface. All of these considerations are not so important probably on many road surfaces as the actual weight imposed upon the road per inch of width tire resting upon the surface. In other words, narrow tires supporting heavy loads, having a weight of more than 600 or 800 pounds for each inch in width of tire, do vastly more damage to our roads than do very much heavier loads where the weight per inch of tire width is less. Such loads carried on such narrow tires will practically destroy any road surface except a pavement in a few months if there are many such vehicles using the road every day.

The commission has adopted a plan to determine the weight of traffic, and it is based on one in vogue in both England and France, and also by some other nations on the Continent. This is an assumed weight, or coefficient, for each kind of vehicle using the roads in order to make a fair comparison where traffic varies. The table at the right of page 545 shows the weight of road traffic on Massachusetts roads computed in this way, with the coefficient reduced to tons of 2,000 pounds each in every case.

Here again, the report states, not only are the changes in traffic notable, but the weights are even more important. The average weight per station per day in 1909 was 197 tons; in 1912 it was 512 tons. For horse-drawn vehicles it was 147 in 1909 and only 135 in 1912. The weight of automobile traffic has increased 160 per cent. in 3 years, while the weight of horse-drawn traffic has actually decreased 8 per cent. in the same time. While this is true, note what happened: Motor trucks have come in with an average of 11 per station, and their weight is nearly 72 tons a day. The weight of teams decreased 12 tons

RESULTS WITH VARIOUS ROAD MATERIALS

	Light Teams	Heavy Teams, One Horse	Heavy Teams, Two or More Horses	Automobiles a Day
A good gravel road will wear reasonably well and be economical with..	50–75	25–30	10–12	100–150
Needs to be oiled with.....	.....	.....	.....	Over 150
Oiled gravel fairly good either hot or heavy cold oil. Five-gallon coating (cold oil must be used yearly)..	75–100	30–50	20	500–700
Water-bound macadam will stand with.....	175–200	175–200	60–80*	...**
Dust layer will prove serviceable on such macadam with.....	.....	.....	.....	50–100
Macadam will then stand (but the stone wears, of course) with.....	.....	.....	.....	300–500
Water-bound macadam with hot oil blanket coat will be economical with***.....	150–200	75–100	25–30	Up to 1400****
Will stand at least*****.....	.....	.....	.....	.....
But will crumble and perhaps fail with over.....	.....	100	50******	.....

*Perhaps more.

**Not over 75 at high speed.

***The large number of automobiles seem to keep the oil rolled down when it would be cut up and crumble without this traffic. Water-bound macadam with a good surface coating of tar will stand a very large number of automobiles, but the commission has not used tar extensively as a surface treatment where there is heavy team travel.

****And more with fewer teams.

*****Fifty motor trucks, probably more.

******On narrow tires; or loaded farm wagons, ice and wood teams, etc

AVERAGE DAILY TRAFFIC

Motor Vehicles	1909 Census. 238.5 Stations			1912 Census. 156.5 Stations			Increase or Decrease in Per Cent.
	Average Number per Day, Total	Average Number per Day Station	Percentage of Each Class	Average Number per Day, Total	Average Number per Day, Station	Percentage of Each Class	
Runabouts	4,958.5	20.8	8.5	5,819.0	37.2	11	+ 79
Touring cars	17,950.5	75.3	30.5	27,178.5	173.5	49	+130
Trucks	.....	..	..	1,800.0	11.5	3	..
Total	22,909	96.1	39.0	34,797.5	222.2	63	+131
Horse-drawn vehicles:							
One horse, light	17,033.0	71.5	29.0	8,380.0	53.5	15	− 25
One horse, heavy	11,762.5	49.3	20.0	7,458.0	47.6	14	− 3
Two or more horses, light	1,006.0	4.2	2.0	556.0	3.6	1	− 14
Two or more horses, heavy	6,205.5	26.0	10.+	3,870.5	24.7	7	− 5
Total horse drawn	36,007.0	151.0	61.0	20,264.5	129.4	37	− 14
Totals of all kinds	.....	247.1	..	.....	351.6	..	+ 42

a day; trucks come in with a weight of 72 tons a day, making good the loss in team weight six times over.

With continued increase in road traffic, the question of road-construction assumes a more important position than ever before. It means the resurfacing of many miles of road with some more permanent material than waterbound macadam, and undoubtedly many miles will require reconstruction at a large expense, as the upper 3 inches, at least, should consist of some bituminous macadam.

With this increase in travel, roads will have to be widened, and, wherever possible, highways now 15 feet will have to be made at least 18 feet on all the main through lines. Also it is absolutely necessary today to apply some form of dust-layer or bituminous binder to macadam roads, either on the surface or by incorporating it with the upper 3 inches of broken stone. Unless this is done the roads will shortly be destroyed by high speed motor traffic.

Bituminous Road Answer Well

At the present time the roads in the Bay State are in better shape than they were 3 years ago. The division engineers report that, while there are many stretches that need reconstruction with a more permanent surface, it is also true that the state highways as a whole have stood traffic very well. In Chief Engineer Dean's section he states that bituminous material has been used in the maintenance of state highways during 1912 on 283.55 miles, and in construction on 21.38, and there are at present 729.83 miles on which it has been used either in construction or maintenance. While there have been few failures of bituminous roads the use of bituminous material seems to be at the present time an economical way of preserving the roads under the present traffic, and he recommends the continued use of this material for both construction and maintenance. The commission has on file now petitions for 2,000 miles of highways, showing how the good-roads idea is spreading.

The experience in Massachusetts and elsewhere has shown conclusively that large numbers of swiftly moving automobiles cannot be carried successfully over a waterbound macadam road or over a gravel road. Such a road ravels very rapidly and becomes rutted and disintegrated. Our traffic studies indicate that from 50 to 100 motor cars a day make the use of some dust layer or binder necessary. Possibly its use would prove economical on a road where there is even less motor traffic. With the motor traffic which Massachusetts already has, the commission is obliged, both for economy and efficiency, where a road has heavy team traffic as well, to adopt in construction or resurfacing some form of bituminous mixture for the upper 3 inches on surface at least, or some stronger material like concrete. On the other hand, where there are few teams, and even as high as 500 motor cars a day, oiled gravel roads do very well, or roads of sand and asphaltic oil.

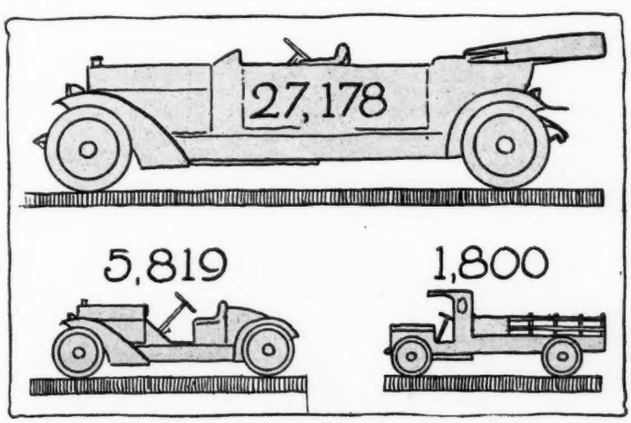
A good many miles of old macadam road have been saved and maintained by .5-gallon of hot asphaltic oil spread upon each square yard of surface and properly covered with sand, pea stone or gravel. Many of these roads have worn 3 years and are on their fourth year and still in good condition. The patching has cost but little, their treatment and maintenance might average from 2 to 3 cents a square yard a year. Yet these roads often have very heavy traffic, often more than 1,000 motor cars a day. One has more than 500 teams and 1,000 motor cars a day, and a heavy blanket of oil has worn well for three years and is going on its fourth.

One of the most important statements of the commission was the admission that teams drawn by horses do a great deal of damage. It is not the number, but the heavy teams that count.

As a result of all the experiments, the commission has prepared the table at the right of this page showing as nearly as may be the results which have been observed after 4 years of experience with bituminous materials, comparing these results with the traffic going over the road in 1909 and 1912.

WEIGHT OF TRAFFIC ON MASSACHUSETTS ROADS

Motor Vehicles	1909			1912		
	Average Number per Day, Station	Assumed Weight (Tons)	Weight per Day, Station (Tons)	Average Number per Day, Station	Assumed Weight (Tons)	Weight per Day, Station (Tons)
Runabouts	20.8	1.43	29.7	37.2	1.43	53.2
Touring cars	75.3	2.23	167.9	173.5	2.23	386.9
Trucks	....	6.25	....	11.5	6.25	71.9
Totals	96.1	....	197.6	222.2	....	512.0
Horse-drawn vehicles:						
One horse, light	71.5	.36	25.7	53.5	.36	19.3
One horse, heavy	49.3	1.12	55.2	47.6	1.12	53.3
Two or more horses, light	4.2	.54	2.3	3.6	.54	1.19
Two or more horses, heavy	26.0	2.46	64.0	24.7	2.46	60.8
Totals	151.0	....	147.2	129.4	....	135.3
Totals of all kinds	247.1	....	344.8	351.6	....	647.3



How the total amount of motor traffic in Massachusetts during 1912 was divided among the touring car, runabout and truck classes of motor traffic

At the left, cleaning the shoe with gasoline and cloth. At right, cleaning out a cut with screwdriver and rag

Tire Repairs—Roadside and Garage

Part II.

Time Spent in the Garage Cuts 30 Per Cent. from Tire Cost

By J. Edward Schipper

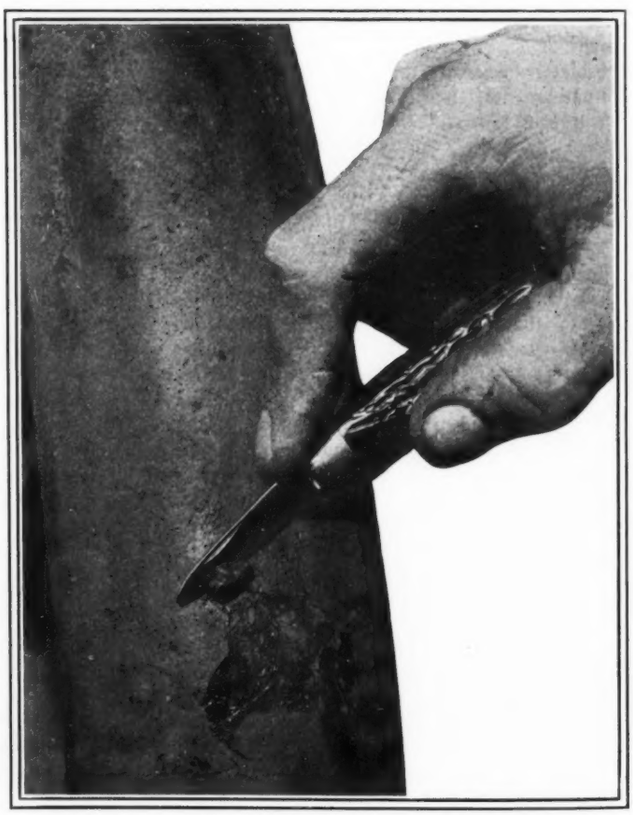
AN hour in the garage saves three on the road. An evening spent on the tires while the car is in the garage will save many dollars during the season and will save many an unpleasant experience on the road. The first work to be done is the permanent repairing of the tubes which have been punctured or hastily patched. Slow leaks should also be looked after and cured. This is the tube work. On the shoes the filling of cuts and tears and the curing of bruises will be the cases to diagnose and heal.

Repairing the tubes in the garage will be the same as on the road except that the repair should in every case be vulcanizing. There are many owners of cars who rely on the cement or no-cement patch in making these repairs, but they are without exception, the ones that will be found under the blistering sun on the road, changing tires. A small vulcanizer can be bought anywhere from $3 to $10 for use in the garage and will have more than paid for itself after a season's use. In the garage where electric lighting is used, a small electric vulcanizer will be handy and safe. The method of preparing the tire for this type of vulcanizer is the same as that described for the portable, the manner of attachment alone being different.

When a slow leak is discovered, the valve is generally suspected. Using the valve cap as a screwdriver in the usual manner, take out the valve and screw in another. This will almost always stop the trouble if it is in the valve. When a slow leak is not in the valve it is often at the point of juncture of the valve and the tube. This is not always so easy to repair, although it may be done as follows:

First, tighten the nut found at the base of the valve. Leaks around the valve are often due to this nut working loose. When the nut is perfectly tight and the leak continues, it is due to a split in the valve patch. This patch is several inches long with a hole in the center for the valve to pass through. For the central three-quarters of its length it is quite thick owing to a strip of fabric which is inserted to keep the edges around the valve from tearing. If the fabric is split at the valve hole, tightening the nut will do no good and a new patch will have to be put on.

To remove the old patch, remove the nut, the lug or saddle if

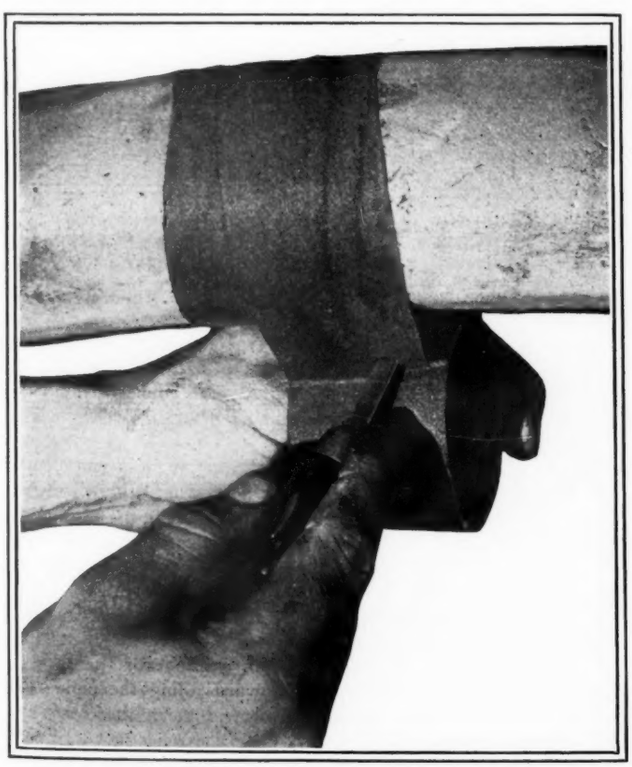


Scraping away the excess filling material after filling a cut

At the right is the operation of priming a cut with cement applied with a stick. At left, filling the cut with tire filler

one is fitted and the washer, leaving the valve in the tire. With a sharp knife dipped frequently in gasoline, work off the edges of the old patch. A new patch can be bought at any well equipped supply house or secured through the agency of any of the tire companies. The patch is put on in the same manner as the inner tube patches described above except that it is better to put on three coats of cement, allowing each to dry thoroughly before finally applying the patch on the fourth coat. Remember to allow the fourth coat to become very tacky, or sticky before applying the patch. Put a firm weight on the patch to hold it in place while drying.

Tire casings or shoes perish in two ways: first, by the wearing away of the surface until the fabric is worn through; second, through cuts, bruises, and breakdown due to under-inflation or other abuses. The object of the owner is to have his tire shoes wear out in the first-mentioned way. The second is poor economy.



Taping the tire as temporary protection after a repair

The first step in maintaining the health of the tread until it dies a natural death, is the filling of the small cuts as fast as they appear. This is the biggest tire economy that can be accomplished by the owner and it actually means dollars in his pocket at the end of the season. It takes less than 5 minutes to fill the average cut and it is perfectly possible for an occasional 5 minutes to add 2,000 miles to the life of the tire. Tire cost on a car is generally from 3 to 4 cents a mile. In other words, you are earning $80 in this 5 minutes!

Jack up the wheel with the tire inflated. Sit on a low stool in front of the tire with the light coming over your shoulder and have at your hand the following:

1—Small can of tire cement.
2—Small can of tire tread cut filler.
3—Thin-bladed pocket knife or tire probe.
4—Small bottle of gasoline.
5—Roll of tire tape.
6—Some waste and soft cloth.

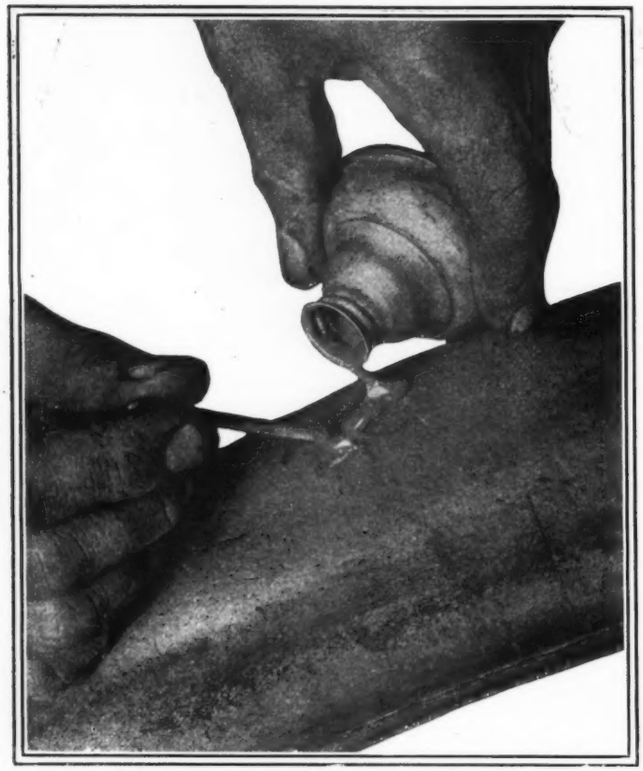
Revolve the wheel slowly, the top coming toward you, closely scanning the surface of the tire for cuts. (If the tire is dirty, wash the surface with soap and water and dry it off with a piece of dry waste.) When you come to a mark that has the appearance of being a cut, take the knife and carefully probe it. Very often you will find beneath the surface of the tire a small piece of glass, a bit of metal or a sharp stone. Remove the offending article. You then have five steps to perform.

1—Wrap an end of the cloth closely around the blade of the knife and dip it into the gasoline. With the dampened cloth cleanse the cut. You will have to dampen the cloth with the gasoline several times before you get the wound perfectly clean and white with all the grit removed. With a small piece of the waste dipped in gasoline clean the rubber around the edge of the hole.

2—With the knife blade or a match stick work tire cement into the hole so that the entire inside surface of the cut is covered. Let this dry thoroughly, it will save time if you bring all the other cus in the shoe up to this stage before coming back to this cut. By working around the tire all the cuts can be brought to this point and you then are ready to go on.

3—Again work cement into the hole in the same manner as before and immediately proceed to:

4—Open the can of tire tread cut filler and take out a piece just too large to fill the hole. Knead this between the thumb



First step in vulcanizing—applying the cement

and forefinger of the left hand. The fingers must be clean or the filling material will pick up the dirt and be valueless. If they are dirty a little gasoline will clean them. When the filling material is quite plastic, still holding it in the forefinger and thumb of the left hand, bring it over to the cut and with the knife or match stick in the right hand and firmly work it into the cut. Fill the cut thoroughly and then with the knife cut off any excess material.

5—Wrap one or two loops of tire tape firmly around the filled cut to exclude the possibility of dirt being worked in while pushing the car back to its position in the garage.

The plastic material will be very firmly knit to the rubber of the shoe if the work is done carefully. The most important part of the work as far as insuring a good connection between the plastic material and the shoe is concerned is to have the rubber clean before applying the kneaded material. When the plastic becomes hard it is very resilient and will withstand the effects of travel for a considerable length of time. The exact time that a plastic-repaired cut will wear depends directly on the size of the cut and on its position.

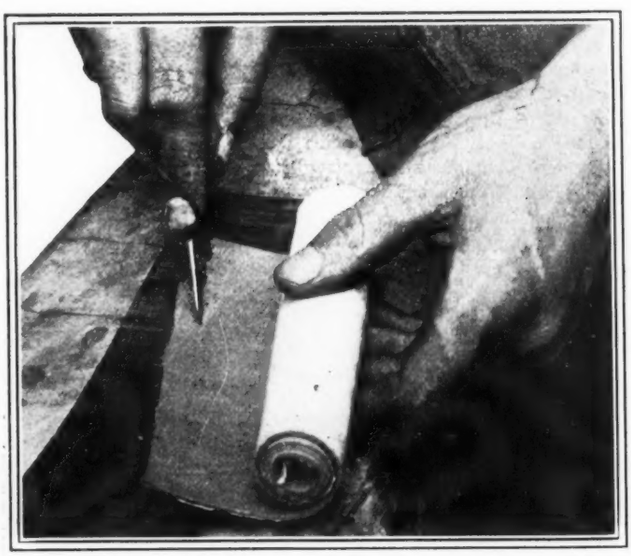
Small Cuts Are Dangerous

The reason that the use of the plastic is so important is perfectly familiar to anyone who has had any experience with tires. It is a source of the greatest wonder to the tire repairers themselves that people do not seem to realize the amount of money that is lost each year through the failure to keep water out of the cuts in tires. The water gets into the fabric and rots it in remarkably short time. Sand works its way in and in a short time forms the much-dreaded sand blister below the tread. When the tire is badly gone, the owner commences to think of having a section put in, that is, having the bad part of the tire cut out, and a new piece put in. This is expensive and it is always doubtful whether a tire repaired in this way will last long.

A small vulcanizer will do wonders with the minor cuts. It does the work better than it can be done with the plastic material because it closes the hole instead of merely filling it. Plastic material is gouged out after a time or it deteriorates, while the vulcanized cut leaves the rubber in about the same condition as before it was cut if the work is done correctly. The method of procedure is as follows:

Vulcanizing a Cut Shoe

The first step in the repair of a cut in the shoe, regardless of the depth to which it is cut, is to scrape around the cut with a rasp until there is clean rubber or fabric around the entire cut. The exposed surface should then be rubbed with a wire buffing brush, which is generally furnished as part of the tool kit. This will give a good surface for the cement to take hold. After the roughening process is complete, the surface should be given a coat of vulcanizing cement and then left to dry. When thoroughly dry the fresh cement will have a glossy appearance. A piece of raw rubber which comes with the vulcanizer, or which can be secured from any tire repair shop, is fitted into the cut. If it is a long cut that has taken off a considerable area of rubber, a piece of raw rubber is cut to the same shape as the piece torn off, or if it is merely a cut to be filled a small piece of the raw rubber is inserted in the cut. In the case of a cut or tear of the tread, the rubber is cut away from the damaged portion in a rectangular shape and the new piece of rubber is cut approximately to size and then rolled into place with a small stitcher roller which marks the exact size. The excess rubber is then cut away.



Cutting the tread stock for vulcanizing

If the cut is deep two, or sometimes three, layers of rubber have to be placed one on top of the other to bring the rubber up to the level of the surrounding tread.

The vulcanizer, regardless of the type used, whether electric or steam, is raised to the vulcanizing temperature and applied to the damaged spot by means of clamps. The rubber around the spot to be vulcanized is powdered thickly with talc before clamping the vulcanizer in place.

On a very shallow cut, the vulcanization can be accomplished as quickly as 10 minutes. On deeper cuts, where there are two or three coats of rubber to penetrate, it will take as long as an hour. The average time required for vulcanizing a cut will be 35 minutes from the time the vulcanizer is attached to the time of removing it from the tire.

For the owner who does not care to do his own vulcanizing, it will be cheaper in the end for him to have small vulcanizing jobs done as they come up rather than waiting for the shoe to blow out before anything is done toward filling the cuts. If the cuts are allowed to go too far it will mean that the shoe will either have to be replaced at the price of a new one less the amount allowed for adjustment or a new section will have

to be put in with the usual dubious results as regards economy.

Underinflation and overloading are first cousins. The effects on the tire are similar but the cure for the resulting trouble is a higher pressure in the first case and oversize tires in the second. It is not feasible to attempt to meet an overload by an increase in the pressure of the tire. An overload for a given size tire can only be met by putting on a larger size.

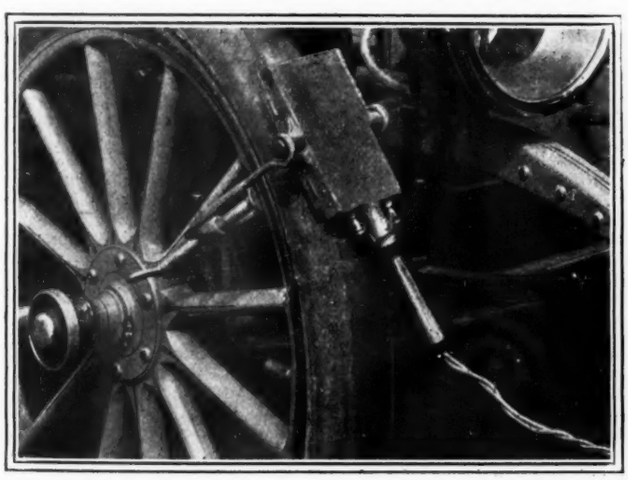
Proper inflation is necessary at all times, but before the inflation table is studied the user of the car must know that the tires are capable of economically handling the load placed upon them in regular service. The tire makers agree very closely on the amount of weight to be put on each tire size. They are also practically agreed on the inflation pressure and a study of the tables will show that the proper inflation for any given size tire is eighteen to twenty times the cross-sectional diameter. A 30 by 3-inch tire will carry 60 pounds; a 30 by 4.2-inch tire will carry 90 pounds; a 37 by 5-inch tire will carry from 90 to 100 pounds.

The inflation-weight tables published by the Michelin, United States, Goodrich and Firestone companies will give an excellent idea of the care that should be used in inflation. These tables appear in the next column.

There are many tourists who state that a tire can be deflated to about two-thirds of its full designed pressure for traveling over very rough and rocky roads. The object of this is to make the tire less likely to be cut by sharp stones owing to the yielding nature of the shoe when not fully inflated. This can be done to good advantage if the tires are immediately pumped when the rough part of the road is passed over. Traveling on the partially-deflated shoe does not injure the tread so much as it does the side walls, owing to the rolling friction which is put on this part of the tire when it is running soft.

The distortion due to traveling on a soft shoe is most noticeable by the wavy appearance of the tread, due to the fact that this part of the tire has stretched until it has become larger than the body of the tire which carries it. There is no cure for this wavy thread. No adjustment is possible either on the tread in this condition because when it is returned to the tire man he will immediately recognize the shoe as one which has been abused by traveling under-inflated.

As it is well recognized that an ounce of prevention is worth a pound of cure, whether it be acid cure or vulcanizing, it would



The electric vulcanizer can be applied to inflated tire

not be out of the way to mention a few points of material effect in lengthening the life of a shoe.

Keep spare tires covered by waterproof and sunproof of dark covers. Heat and light deteriorate rubber rapidly, therefore keep tires in a cool, dark place. Do not run long in ruts, car tracks, against curbs or across intersecting pieces of car track. Apply the brakes as easily as possible, start gradually, do not lock the wheels, run at moderate speeds on hot days, turn corners slowly with clutch disengaged and always keep a weather eye open for broken bottles, or any other tire-destroying instruments along the road. In leaving the tire standing for more than 3 or 4 days reduce the pressure in the tires to about 40 pounds and if the car is to stand more than 2 weeks without moving block up all four wheels. Either in a public or private garage insist upon having the floor upon which your car is standing free from grease or oil.

Tables of Load and Inflation

MICHELIN

Tire Size	Maximum Axle Load	Pounds Inflation
3 inch	600-1000 pounds	50-60
3½ inch	800-1600 "	50-70
4 inch	1300-2200 "	60-75
4½ inch	1400-2600 "	70-80
5 inch	2200-3200 "	70-80

UNITED STATES

Tire size	Weight per front wheel	Weight per rear wheel	Tire size	Weight per front wheel	Weight per rear wheel
28x2½	275	225	36x4	900	750
28x3	425	350	40x4	1000	850
30x3	450	375	42x4	1050	900
32x3	450	375	32x4½	950	750
28x3½	500	425	34x4½	1125	900
30x3½	550	450	35x4½	1175	935
31x3½	575	475	36x4½	1225	975
32x3½	600	500	37x4½	1260	1010
33x3½	625	525	38x4½	1300	1050
34x3½	650	550	42x4½	1450	1200
36x3½	700	600	34x5	1200	950
30x4	750	625	35x5	1250	1000
31x4	775	635	36x5	1300	1050
32x4	800	650	37x5	1350	1100
33x4	850	675	39x5	1450	1201
34x4	875	700	43x5	1550	1400
35x4	885	735	37x5½	1400	1150
			38x5½	1450	1200

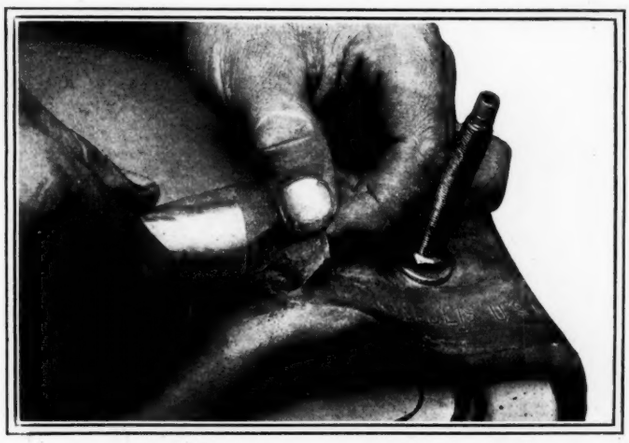
Inflation 20 pounds for each inch of tire diameter, i.e., 3-inch diameter tires have 60 pounds; 4½-inch, 90 pounds, etc.

GOODRICH

Tire size	Weight per front wheel	Weight per rear wheel	Inflation pounds	Tire size	Weight per front wheel	Weight per rear wheel	Inflation pounds
28x2½	275	225	55	38x4	950	800	75
30x2½	275	225	55	40x4	1000	850	75
28x3	425	350	65	42x4	1050	900	75
30x3	450	375	65	32x4½	950	750	80
32x3	450	375	65	34x4½	1125	900	80
34x3	475	400	65	36x4½	1225	975	80
28x3½	500	425	70	38x4½	1300	1050	80
30x3½	550	450	70	40x4½	1375	1125	80
32x3½	600	500	70	42x4½	1450	1200	80
34x3½	650	550	70	35x5	1250	1000	85
36x3½	700	600	70	37x5	1350	1100	85
30x4	750	625	75	39x5	1450	1200	85
32x4	800	650	75	41x5	1500	1300	85
34x4	875	700	75	38x5½	1450	1200	90
36x4	900	750	75	40x5½	1600	1350	90

FIRESTONE

Tire size	*Weight per Wheel	Inflation	Tire size	*Weight per Wheel	Inflation
28 to 36x3	350	50	34x4	700	75
30x3½	450	60	36x4	750	75
32x3½	550	60	32x4½	700	85
34 and 36x3½	600	60	34x4½	900	85
30x4	550	75	36x4½	1000	85
32x4	650	75	36x5	1000	90



The valve patch can be removed by the aid of gasoline

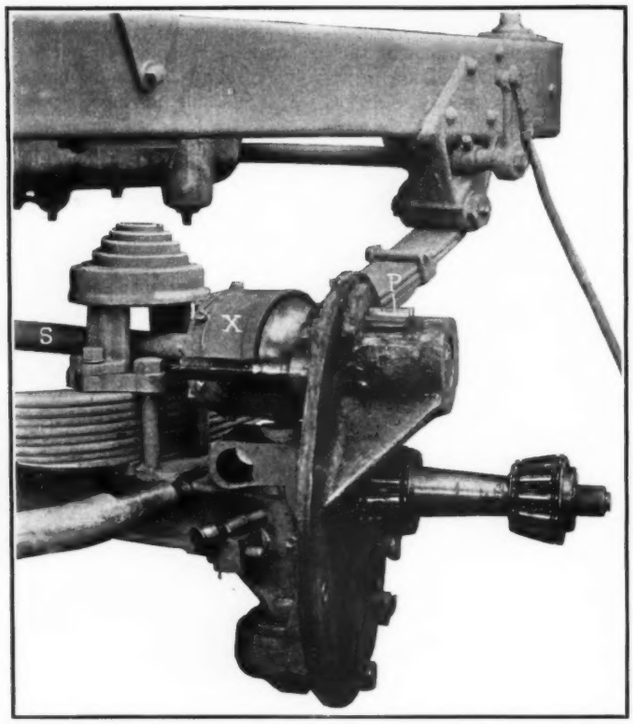


Fig. 1—Steering connections and universal joints used on new Jeffery truck

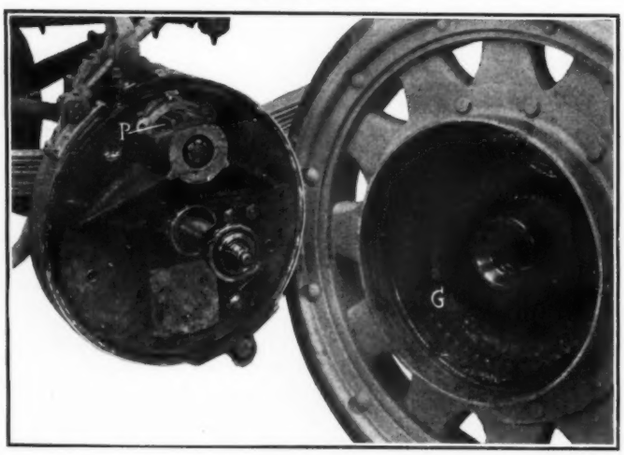


Fig. 2—The new truck brakes on all four wheels. One of the drums

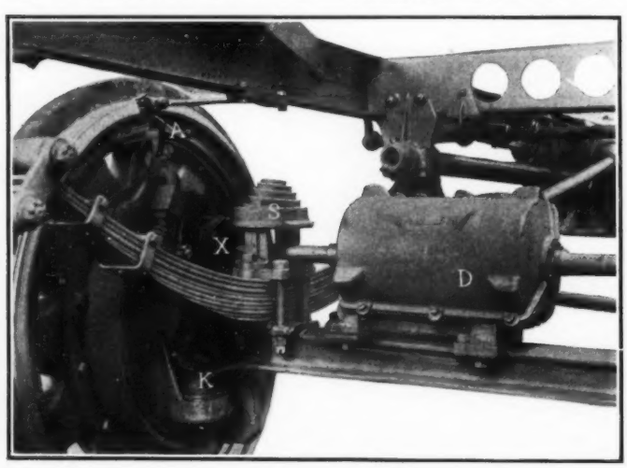


Fig. 3—Showing the differential attachments at the rear end of the new truck

New Jeffery Truck Has 4-Wheel Drive and Steer

Designed To Meet Army Requirements, It Will Carry 20 Per Cent. Overload—Brakes On All Wheels

THE influence of the United States Army on motor truck design is well exemplified in the new 1.5-ton Jeffery truck, which, to meet the specific requirements of the military demanding that it can carry a 20 per cent. overload, and travel anywhere a four-mule team can pull a wagon, has resulted in driving all four wheels, in using all four wheels for steering, and in using all four wheels for braking.

This quadruple driving, steering, and braking has its efficiency well exemplified. For example: In braking the truck can be stopped in 8 feet when traveling 15 miles per hour. In spite of its 125-inch wheelbase it can be turned in a circle 45 feet in diameter, a result made possible by mounting all four road wheels so that they can be used for steering. The pulling ability of the truck should come well up to requirements in that on fourth, or high, speed the gear ratio between the motor and rear wheels is 8 to 1 and on low speed 32 to 1, this latter reduction making it possible to meet road difficulties such as deep sand, mud, and steep hills.

But the influence of the army on this truck is shown in still another respect, namely, in the interchangeability of parts. Any one of the four driving wheels can be used for front or rear axles, or for right or left sides. There are three differentials in the driving system and all are interchangeable. There are four brakes, one on each front wheel and one on each rear wheel, and all are interchangeable. There are two propeller shafts, one to a front axle, the other to the rear axle, and these are interchangeable. There are four driveshafts, two in each axle, for connecting the differential with the road wheels, and these four are all interchangeable. This interchangeability of parts greatly reduces the number of spares required by the army in its service departments and also when operating in the zone of war activities.

Drive Taken from Both Ends of Gearbox

The *modus operandi* of this four-wheel drive, four-wheel steer and four-wheel brake truck has been carefully worked out by the Thos. B. Jeffery Co., at Kenosha, Wis. The four-cylinder motor is mounted conventionally in front under a bonnet. From the motor the drive passes through a flywheel clutch to the four-speed gearset located amidship. Here conventionality ceases. Instead of the drive being taken from the rear end of the gearbox it is taken from both ends. Incorporated with it and to the left of the gearbox is a differential gear the same as used in the ordinary rear axle. From this differential one propeller shaft extends forward to the front axle and another rearward to the back axle.

The axles are both alike, each being of the combination stationary-live design in that there is an I-beam portion, not unlike the front axle of a truck, for carrying the weight and the steering parts, and directly above it is the live portion consisting of the differential and the driveshafts to each road wheel, this live portion resting on the stationary part. From the differential in each axle the driving power is transmitted through the axle driveshafts, which are external. Each driveshaft carries a spur pinion on its outer ends, this pinion meshing with an internal gear in the wheel hub. Each axle driveshaft has a dust-proof universal joint which is in the same vertical plane as the vertical steering pin of the knuckle. These joints permit of a maximum turning angle of 20 degrees of the road wheels for steering purposes.

The motor is of four-cylinders cast in block, 3.75 by 5.25 inches in cylinder dimensions. The motor bearings are somewhat larger than ordinary. The camshaft is operated by spiral gears and special attention has been given to provide large water space in the cylinders so that uniform cooling of the cylinder walls is insured. A Bosch magneto and Rayfield carbureter comprise the motor equipment.

From the motor, power is transmitted to a Borg & Beck single disk clutch. This clutch is of somewhat novel design, and consists of a single ring of Raybestos interposed between the flywheel and a single steel plate on the gearset shaft. Against this steel plate is a second Raybestos ring and behind it is a

compression ring which carries wedges. Toggles with roller ends are carried in the sheet metal cover plate and these rollers release the clutch as they move downward on the wedges when the pedal is pressed. The feature of the clutch is the adjustment, which consists of two small nuts outside of the cover plate. These are moved inward or outward for adjustment.

From this clutch the drive is through a mainshaft with universal joints at either end to the gearbox, which is supported amidship upon a cradle formed by the crossmembers of the frame. The gearbox provides four speeds forward and the drive in the gearbox is through a layshaft to the propeller shaft in which there is incorporated a Wayne differential or equalizer. All of this is within the gearset housing. These propeller shafts to the front and rear axles are so arranged that they are at an angle of about 4 degrees downward from the gearbox when the truck is under load.

Front and rear axles are alike in every respect. Upon the dead axle is mounted a differential and from it extends the axle shaft whose outer ends carry spur pinions which mesh with an internal or annular gear on the driving wheel. The pinion is mounted on the steering knuckle and each shaft is provided with a universal joint which permits an angle of 20 degrees in the shaft.

The casting of the wheel housing is chambered out to permit the internal gear ring to be mounted with its inner edge just under the center of the tread. This permits the driving torque to be transfered to the wheel very close to its line of action and gives a direct application of the power.

The steering arrangement at the rear is a duplication of that at the front and is conventional except that from the steering column a long tube runs to the rear, where it connects with a drag link running across the chassis to the right knuckle. The steering gear is of the Lavigne type with a vertical column located on the left side.

Differential Drives Wheel Pulling Hardest

The employment of the Wayne type of differential in the gearbox has a feature *of driving the wheel which is pulling the hardest,* that is, the one which has the traction, instead of the idle wheel. This makes it certain that there will be tractive effort in one *wheel even if all the other three were slipping.* The provision of the intermediate equalizer in the gearset is to properly distribute the power between the front drive and the rear drive just as the equalizers on the axle distribute the power between the two wheels on that axle.

All the wheels are cambered and the axles incline forward to give a castor effect for ease in steering. This is an especially good feature on rough ground.

The brakes are contracting band types, the only difference in the connections from usual construction being in the location of the brake arm pivot, which is a swivel joint located vertically over the steering pin so that the braking is not interfered with when the wheels are turned. The pedal and lever connections are so arranged that when the pedal is pressed the foot brakes are applied on all four wheels but the lever remains stationary; however, when the lever is operated, the pedal is moved, in addition to the application of all the brakes. This is intended to give the driver a double pressure in case of an emergency.

The frame is 200 inches in length and 38 inches wide. It is 5 inches deep, 2 inch flange and of 3-16 inch heat-treated steel, reinforced with gussets at the corners.

The vehicle is intended to be used as a tractor at times and the center of the rear crossmember of the frame is fitted with a spring eye coupling for attachment of the trailer. The frame at this point is reinforced by diagonals so that the pull from the coupling is all taken by the side member.

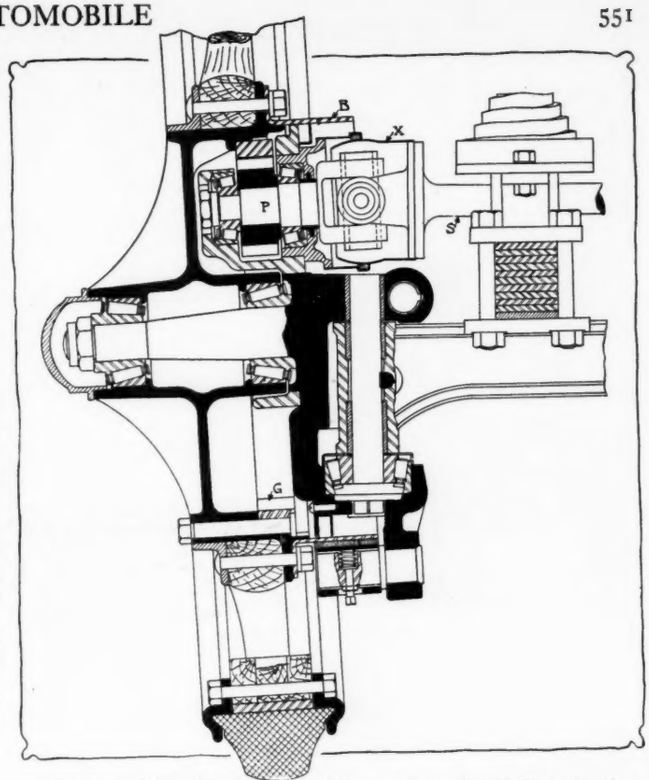


Fig. 4—Section through the wheel used on the Jeffery truck

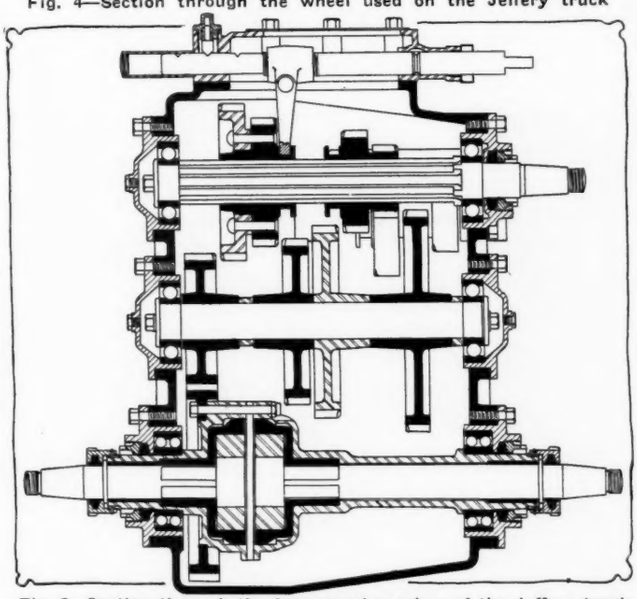


Fig. 5—Section through the four-speed gearbox of the Jeffery truck

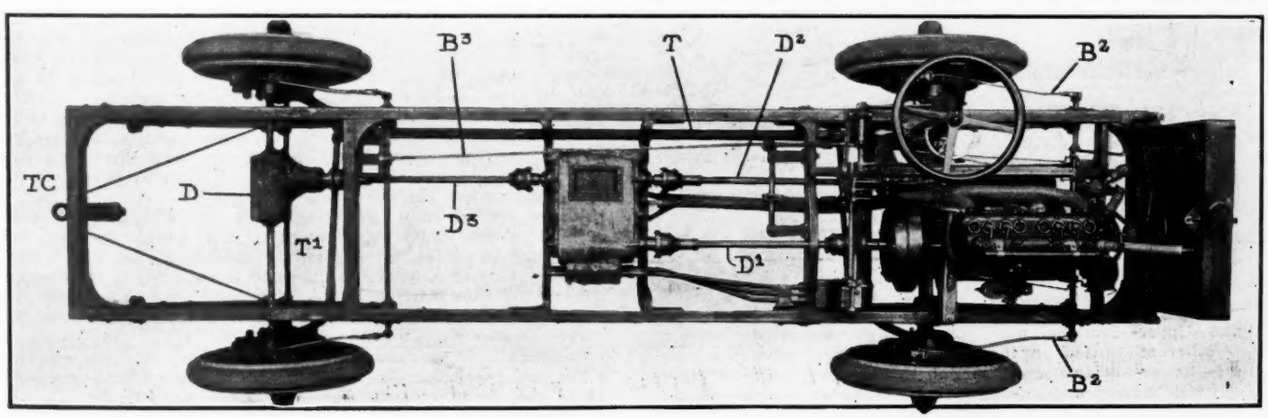


Fig. 6—Plan view of the chassis, giving an idea of the connections for driving, steering and braking with all four wheels

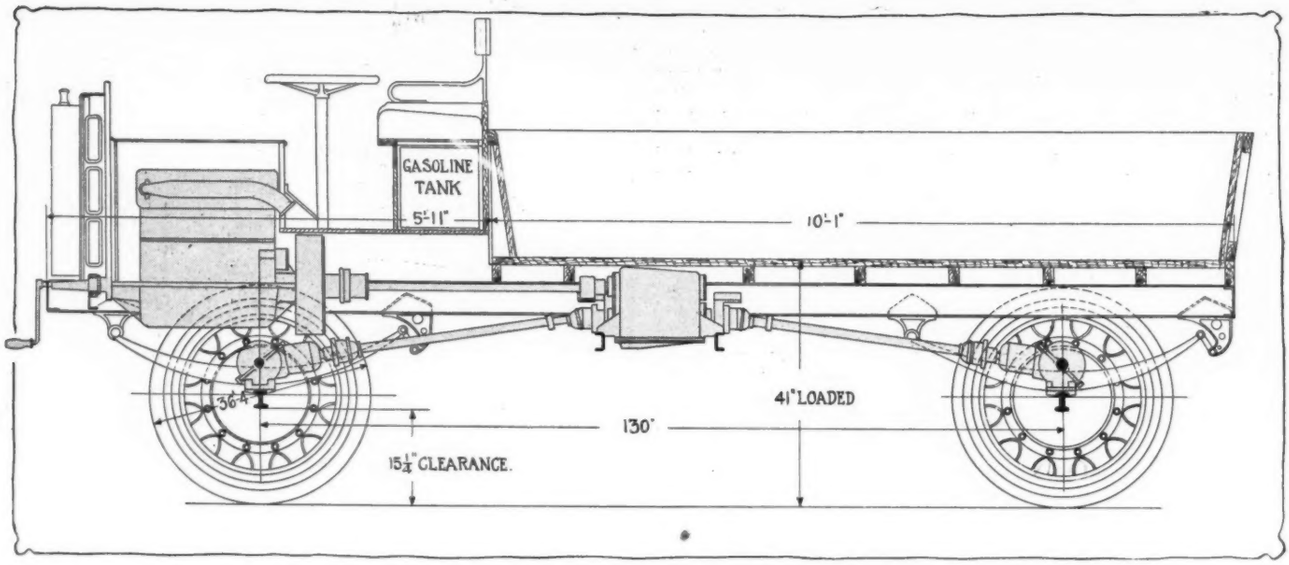


Fig. 7—Side elevation of the new four-wheel drive Jeffery, showing the entire power transmission system

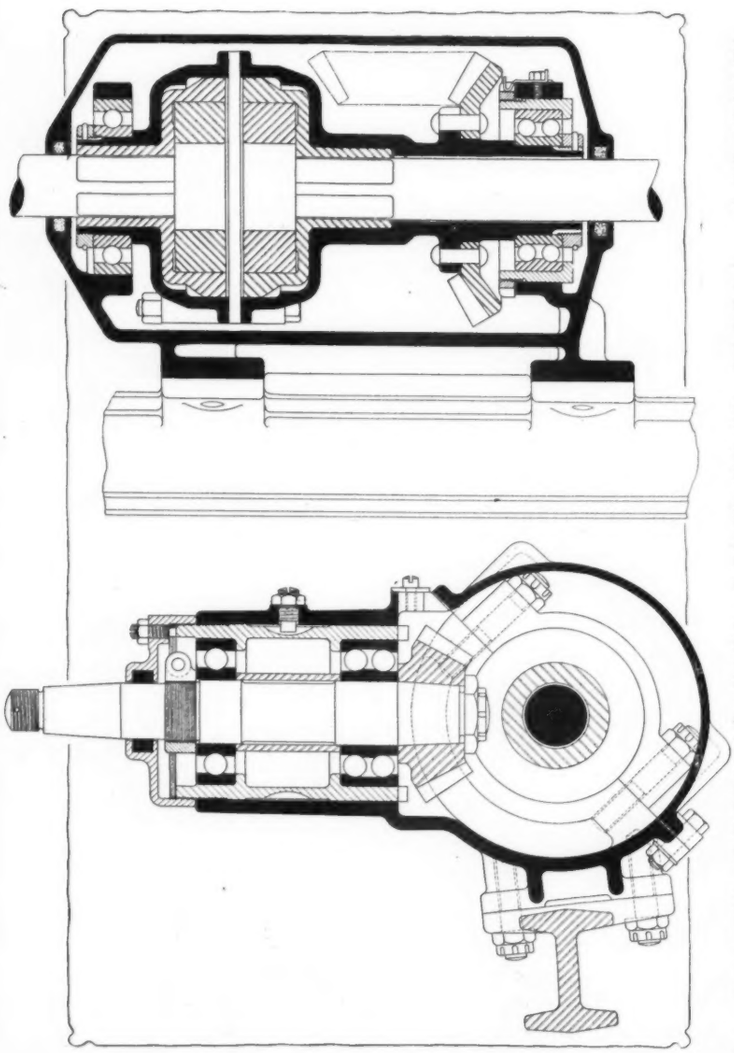


Fig. 8—Upper—Sectional plan view through the Wayne type of differential used on the Jeffery four-wheel-drive truck
Fig. 9—Lower—Vertical cross section through bevel gear, differential housing and axle, showing method of mounting

All the driving torque and braking effort is taken through the springs; there are no radius rods or torsion tubes. The spring lugs are consequently very heavy and the springs themselves are electro-silicon-manganese steel, 2.5 inches wide by 3 inches deep and are 52 inches between spring eyes. Directly underneath the frame upon each I-beam axle is mounted a coil-spring bumper. This is mounted upon a base which straddles the live axle shaft and serves to protect the latter in case the semi-elliptic main springs break.

Weight Is Carefully Distributed

Particular attention has been paid in this design in the matter of distribution of weight. The motor is set 5 inches to the right of center, while the gearbox is a little to the left of center, both being so disposed that the center of gravity is in the median line of the chassis. So well has the design been carried out that when the car is weighed on all four wheels separately the weight does not vary 25 pounds.

A car speed of 14 miles per hour is obtained at 1,000 revolutions per minute of the engine. The gear ratios range between 8 to 1 on fourth or high and 32 to 1 on low. Solid tires, 36 by 4 inches, are used. With this wheel-size the top of the frame is 35 inches from the ground loaded and the minimum clearance in the center is 25 inches and the minimum clearance under the axle is 15 inches. The motor is set very high and the carbureter and magneto are set above the crankcase so that the car may negotiate very deep water without stalling. Along with left drive, center control is provided and the driver's seat is wide enough to carry three people.

To prevent damage to the radiator from road shocks it has a sort of three-point suspension, being mounted at each lower corner upon spring plungers while the horizontal rod which extends from the upper edge to the dash has a spring connection.

Accessibility Is Highly Developed

As to accessibility, the gearbox is an example. Any one of the shafts with its gears can be taken out and replaced without touching the rest of them. The end caps may be removed when bolts are taken out and to these the bearings are attached so that both the shaft and its bearings are pulled out together. Any of the gear shifters can be taken off without disturbing the gearset.

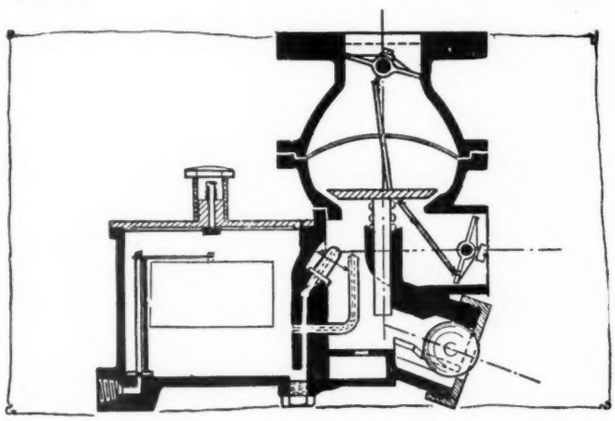
The removal of twelve bolts frees the differential case on the rear axle and four bolts liberates the axle shafts so that the whole axle assembly or any part of it can be lifted off for replacement while the car is loaded.

Brakes are adjusted by a single nut on the brake pull yoke and the removal and replacement of the wheels requires but 15 minutes and does not necessitate unloading.

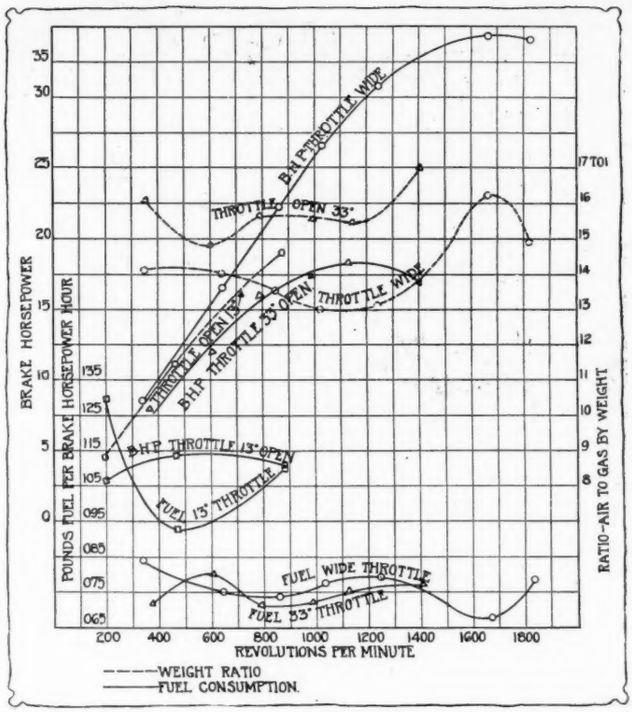
A very neat idea where rapid work is required is the method of holding the starting crank handle. Upon the frame is mounted a clip on a pivot which is held normally against the frame by a spring during cranking but when the engine is running extends to catch the crank and keep it from rattling. When the crank handle is taken out of the clip to start the engine the clip flips back automatically.

A.C.A. Tests Sunderman Carbureter

A TEST on the Sunderman safety carbureter manufactured by the Sunderman Carbureter Co., Newburgh, N. Y. at the laboratory of the Automobile Club of America has shown some interesting results. The carbureter was attached to a 4.125 by 4.75-inch, four-cylinder Northway motor and a series of runs made with three different throttle positions, 1—wide open; 2—throttle set in such position that the brake load at the speed of maximum power was one half that at the same speed in the wide open throttle runs; 3—throttle so set that when the engine was under no load the maximum speed was one half that of maximum power. The spark was set for maximum power at each speed, air measurements were made by the use of a calibrated Venturi meter. Three runs were made with varying throttle and in these runs the rheostats controlling the load on the dynamometer were given the same adjustment employed to hold the motor at its speed at maximum power in the previous runs. The throttle was opened and closed periodically by cams and a linkage which repeated their cycle of operation every 8 or 10 seconds for a period of 5 minutes. During this time the fuel consumption and the number of revolutions of the motor were measured. The results are set in graphic forms in Figs. 1 and 2 and in the accompanying table. Table 1 shows the first series of runs and table 2 shows the runs with the varying throttle.



Section through the Sunderman safety carbureter



Three runs were made in different throttle positions, first with throttle wide open; second with throttle set so that brake load at speed of maximum power was half that at same speed in first run; and third with throttle set so that with no load maximum speed was half that of maximum power

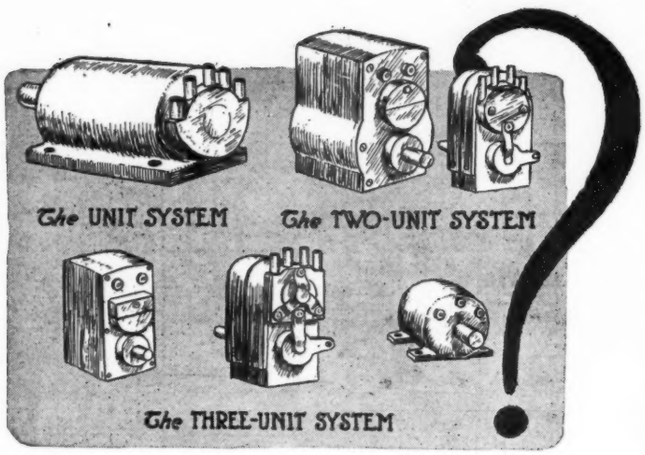
TABLE 2 OF RUNS WITH VARIABLE THROTTLE

Dur'n of Run, Mins.	Mean Rev. per Min.	Speed Range Indicated by Tachometers		Pounds Gasoline		Cylinder Jacket		Sec'ds Throttle Variation		°Spark Adv. on Flywheel
				Per Hour	Per 1000 Rev.	Water In	Temp. °F. Out	Opening	Closing	
5.75	1198	1009	1299	17.7	0.25	125	144	4	4	15°
5.48	1230	1151	1349	17.8	0.24	126	146	2	8	18°
5.28	1328	1209	1442	17.2	0.22	128	148	6	2	28°

TABLE 1, SHOWING RESULTS OF TEST RUNS ON SUNDERMAN SAFETY CARBURETER

Spk. Adv., Deg.	*Duration of Runs, Mins.	Rev. per Min.	Torque, Lbs. Ft.	Brake, H.P.	Fuel per B.H.P. Hour	**Therm. Eff. %	Ratio Air to Gas by W't	Air Con's'n		Exhaust Gas Constituents			Temp. Exh. F.°	Temp. °F. Cooling Water		Temp. °F. Air Mixture		Suction Above Carb. Ins. Hg.	Exh. Back Press. Ins. H_2O
								Lbs. per Hour	Cu. Ft. Min.	% CO_2	% O_2	% CO		In	Out	Ent. Carb.	Leaving Carb.		
								Throttle		Wide	Open								
30	3.00	1824	98.2	34.0	0.78	16.0	14.9	398	87	..	..	..	1260	120	141	77	42	3.8	6.8
30	3.00	1665	107.5	34.1	0.67	18.6	16.3	374	81.1	10.3	0.4	2.2	1295	132	155	77	42	3.4	6.1
23	3.25	1244	129.5	30.7	0.79	15.8	13.1	309	67.9	..	..	..	1210	135	158	78	35	2.6	5.9
18	3.00	1024	135.0	26.3	0.77	16.2	13.0	265	58.1	10.1	1.0	2.9	1155	134	160	78	37	2.0	3.4
13	3.00	864	135.0	22.2	0.73	17.1	13.6	220	48.1	..	..	..	1110	130	158	79	39	1.4	2.6
10	3.00	656	133.2	16.7	0.75	16.6	14.0	175	38.4	..	..	..	1025	142	165	78	38	0.9	2.2
10	4.25	347	124.8	8.3	0.84	14.8	14.1	98.6	21.6	10.3	0.5	3.8	745	141	206	78	40	0.3	2.0
								Throttle 33 per cent.			Open								
30	3.00	1409	62.5	16.8	0.77	16.2	17.0	220	48.2	11.7	0.8	1.9	1195	136	152	74	44	10.0	3.5
30	3.00	1144	83.5	18.2	0.75	16.6	15.4	211	46.2	..	..	..	1110	132	148	74	40	8.4	2.5
30	3.00	996	92.0	17.4	0.72	17.3	15.6	195	42.8	..	..	..	1120	130	150	74	41	7.1	1.7
20	3.00	796	105.5	16.0	0.71	17.5	15.7	179	39.4	11.1	1.2	2.1	1064	131	154	74	41	5.5	2.0
5	3.00	607	103.0	11.9	0.80	15.6	14.8	141	31.0	..	..	..	1047	131	154	76	43	3.5	1.0
5	3.17	368	112.3	7.9	0.71	17.5	16.1	90	19.7	12.2	2.1	0.2	750	131	185	77	47	1.7	0.4
								Throttle 13 per cent.			Open								
30	3.00	882	23.1	3.9	1.10	11.3	14.7	63	13.8	..	..	..	630	130	142	77	43	17.8	0.2
30	5.00	468	51.5	4.6	0.93	13.4	11.5	49.3	10.8	11.6	2.4	0.4	605	130	149	76	43	14.5	0.2
25	6.00	201	71.5	2.8	1.29	9.7	8.8	31.5	6.9	..	..	..	478	129	202	77	47	5.4	0.2

Barometer Reading 29.8 inches mercury.
*Degrees before center (measured on fly-wheel) at which magneto breaker opens.
**Based on a higher heating value of 20,420 B.T.U. per lb. of gasoline. Gravity of gasoline, 61.5°B = 0.733 Specific Gravity.



Engineers Disagree On Starter Units

Part VIII

Westinghouse Man Says That Two-Unit Type Is the Simplest and Most Reliable—Bosch Representative Seconds Him

The Six Questions

1. *Which will be the eventual system, namely: (a) Unit system, in which starting, lighting and ignition are combined; (b) two-unit system, in which starting and lighting are combined, with ignition separate; (c) three-unit system, in which ignition, starting and lighting are separate?*
2. *Respective methods of coupling starting motors with the gasoline motor?*
3. *Possibilities of weight reduction in starting systems?*
4. *Increased accessibility of the battery for starting and lighting purposes and if excessive initial draw from the battery is injurious?*
5. *Positive locking means whereby tampering by outsiders cannot lead to shorting and discharging of batteries?*
6. *Movement to discourage senseless demonstrations of starting motors in which they are used to propel the car for a short distance?*

Editor's Note

Readers of THE AUTOMOBILE who are owners and operators of cars are invited to participate in the present discussion on the relative merits of combined starting, lighting and ignition units.

The three systems are best described as the unit, the two-unit and the three-unit types. In the unit type the electric motor for starting, the electric generator for battery charging, and the ignition system are in one. In the two-unit system the battery dynamo and the starting motor may be combined in one machine with a single armature. In the three-unit system there is a starting motor as one machine, the battery charging dynamo is a second machine, and the magneto for ignition is the third.

It is on the relative merits of these types that this discussion hinges. Owners who have had practical experience with them should be able to give points of much value.

EAST PITTSBURG, PA.—Editor THE AUTOMOBILE:—Your current discussion on the relative merits of single unit, two-unit and three-unit systems has much of interest on the question of which of these systems will be the eventual one in the automobile.

It is impossible to predict at the present time what units will be finally adopted. It is safe, however, to say that the motor car user will demand simplicity and reliability above all else, and at the present time the simplest and most reliable system is represented by a two unit-outfit, combining lighting and battery ignition in one unit and a starting motor as the other unit. Magneto ignition has a hold upon the automobile public because of past experience with this, in contrast with the old vibrating-coil, dry battery system. As ignition from the storage battery, with the ignition parts combined on the generator frame, is now proving its absolute reliability and superiority over the magneto, it is well on its way to complete displacement of the latter. A good battery ignition system easily demonstrates its superiority at very low engine speeds because of the unfailing spark, and at high engine speeds because of the increased spark advance allowable, while at intermediate speeds it is not less efficient than the magneto.

The use of lighting and ignition in one unit and starting in another gives a simpler system than when these are all contained in one unit and, moreover, gives opportunity for a better-balanced application. It should go without saying that if the two units can be built separately so as not to weigh more or cost more than the combination outfit, that there is a distinct disadvantage in the combination on account of the added complication. Combinations which use two separate armatures in tandem, or one above the other, are in reality two separate machines connected together mechanically, and generally are bulky, unwieldy and of very doubtful mechanical construction.

So far as the best method of coupling the starting motor to the gasoline motor goes, the present arrangement shows coupling either by gearing to the flywheel, or by chain or gear connection to the front end of the engine through an overrunning clutch, preferably on the engine shaft.

Two Schemes Seem Satisfactory

The application at present seems to be pretty well divided between the two schemes either of which, when well designed, is satisfactory.

The possibilities of marked weight reductions in starting equipment are not great. High speed motors are, of course, lighter than low speed, but the weight of the parts necessary to make the application increases with the motor speed. Moreover, there is a limit to the speed which can be used economically, extremely high speeds introducing increased noise in operation and decreased reliability.

While the battery should be of fairly easy access it should not be so placed that it is often tampered with. It needs very little attention if it is charged by a generator which keeps the charging rate from becoming excessive, as under this condition it is simply necessary to look at it occasionally and to keep the electrolyte to the proper level. The voltmeter reading with lamps turned on is a good indicator of the condition of the battery and as long as the voltmeter indication is up to the proper value the battery needs no attention except for the maintenance of the level of the liquid.

It is not considered necessary to provide positive locking means to prevent tampering with the starting system, but it is desirable to protect against meddlesome boys by so arranging the starting switch that it is not readily closed from outside the car.

The battery carried on the car is not supposed to be used for running the car. Almost any starting motor will run a car if the battery is large enough, but the ordinary sizes of battery are not of such capacity as to stand a protracted drain of this kind, and demonstration of running of the car on the battery simply serves to mislead the gullible person who thinks it an indication of high motor power and to increase the chances of battery trouble later on.—A. W. COPLEY, Westinghouse Electric & Mfg. Co.

Ignition Should Be Separate—Bartsch

NEW YORK CITY.—Editor THE AUTOMOBILE:—Gauged by the many and varied arguments which have been extended for and against the so-called "three-in-one" system, which is the com-

bined system for ignition, starting and lighting, the necessity for discussing the arrangement from the viewpoint of reliability seems especially pronounced.

It is the consensus of carefully given opinion that the growth of this three-in-one system has been due solely to public clamor and in this instance public clamor has all but upset the automobile industry; for in their desire to meet the ill-considered demand, sales departments so emphatically brought their influence to bear on the automobile designers that, disregarding lessons which extensive experience had taught, they attached ignition to lighting and lighting in turn was attached to starting, thus connecting ignition to the general electric source, completing a cycle which, although somewhat generally adopted for the 1913 season, was given rather a severe blow before the season actually opened. And why? — because the combined system was a decided reversal of the effort toward simplicity which in motor car practice has been the watchword of the designers — the watchword which has been responsible for the great success of the industry.

The quest for a perfect ignition system, one combining reliability and efficiency, had long been completed; the magneto, since its adaptation to the gasoline engine 20 years ago, had easily swept aside all other methods for igniting the mixture. As an ignition source it had proven so vastly superior to the battery that the latter had grown practically obsolete, and was revived by the manufacturer only on the theory that with the adoption of electric lighting and electric starting there then would be a sufficient current supply from the battery and for that reason apparently, the supposed difficulty inherent in battery systems would be eliminated.

Electric Starting Proved Most Popular

Of the various arrangements for starting the engine, the electrical system has proven without a doubt the most popular, due we may say to the fact that electric lighting has been so universally adopted and therefore the basis of the equipment is to a large extent already in use. It appears then that in combining the function of ignition with lighting and starting the first consideration was none other than economy in production costs.

There is no question in the minds of those who have watched the advances made in automobile design that the car of the future will be innocent of the starting crank — that light, whether it be desired in front or at the rear, will be at the driver's command simply on the pressing of a button. All this, however, may be had without complicating the power plant of the car, without sacrificing the important considerations of reliability and simplicity of the engine, the unit which is in itself the actual foundation of the lighting and starting systems.

Electric System Is a Refinement

In making an analysis of the modern automobile we may quite readily divide it into two distinct parts; the engine or power plant generating the power being one group or part, the chassis and body as well as the refinements and those luxuries which utilize the power generated forming the other group. In the latter group we classify the electric lights, also electric horn, cigar lighter and other refinements.

Reliability of service is desirable in components of the second group, but is not absolutely essential. In the first group it remains that we have nothing but the engine, the power plant, on which the reliability of all depends. It must be absolutely reliable and efficient, for without these essentials the entire car is a failure so far as service value is concerned.

In consideration of this, the ignition system must be free from interference, free from the influence of those accessories which have nothing to do with the generating of power. It should be considered as part of the engine — just as much a part as is a valve or piston. Obviously then, it is absurd to risk the so much desired reliability of the power plant on luxuries requiring an arrangement which may be likened to the human system, having a multitude of delicate nerves spread over a large area and thus subjected readily to exposure or damage, yet so hidden as to make their whereabout practically unknown to other than an expert. Why risk the reliability of a power plant on a system of this kind when it has taken years and years of study and experimentation to obtain the desired dependability? Centralization is much desired in certain systems of manufacture, but overcentralization may prove disastrous, and in a motor car, centralization which would allow the refinements to interfere with the power plant would be like using a piece of twine to link a massive chain that regulated enormous weights controlling important machinery.

Reliability Hangs in the Balance

It cannot be considered sound reasoning to say that, because ignition of the mixture is accomplished by electricity, an ignition system on a car equipped with refinements employing electricity is necessarily bound to those refinements. If that were so, then the main desire — reliability of the power plant or engine — simply hangs trembling on the reliability of luxuries with delicate and obscured connections.

Granted that the greater demand is for an electrically lighted car, also having a power starter, the demand still remains greatest for a reliable engine. The ideal car would therefore be one having the power plant absolutely separate and free from the complication of the refinements, so arranged that if one of these gives out or is damaged it would interfere in no way with the operation of the engine.

It was in the summer of 1912 that public clamor prompted the designers to an extent which made it appear as though the magneto would retire to the shelf, but extensive tests of various forms of combined systems, systems which derived the ignition source from batteries, have proven that the magneto will remain supreme.

Car Makers Are Returning to Magneto

After exhaustive investigations and trials, America's most prominent manufacturers have realized and come to the conclusion that it is necessary to have the ignition system separate from refinements and integral with the engine and accordingly have returned to the use of the proven perfect ignition system, the magneto. Even in cases where factory trials gave apparently good results, manufacturers have been forced to return to the magneto after their cars have undergone the practical test of the open market.

It truly can be said that the production in the industry has been kept up only by the foresight of the magneto manufacturer in refusing to heed the seeming trend toward battery ignition systems combined with starting and lighting. The manufacturers who will continue to depend on a combined system are indeed few in number and in fact every day there are greater indications of their ranks growing even more thin.

There is a lesson to be learned in this, an expensive one for many; let it leave designers less prone to follow the will-o'-the-wisp of popular demand.—A. H. Bartsch, Bosch Magneto Co.

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Benzol and Paraffin as Auxiliary Fuels

In hot weather both paraffin and benzol can be used with ease in conjunction with gasoline. Benzol, in particular, makes an excellent mixture in the proportion of about half and half. It can be obtained at numerous motor-spirit depots at the present time. Taxibus spirit is also more comfortably used when the atmosphere is dry and hot than in cold, damp weather. If motorists in general would only give up insisting on the use of the most refined kinds of motor spirit, their pockets would gain in more ways than one. There is a much larger proportionate supply of motor spirit of specific gravities between .750 and .800 than would ordinarily be supposed. But a prejudice still exists against the heavier form of spirit, shared alike by master and man. More air must be used with heavier grades and the engine run at a warmer temperature, but otherwise any ordinary carbureter will vaporize spirit between .750 and .800 as satisfactorily as it will vaporize the lighter kinds.—From *The Car*.

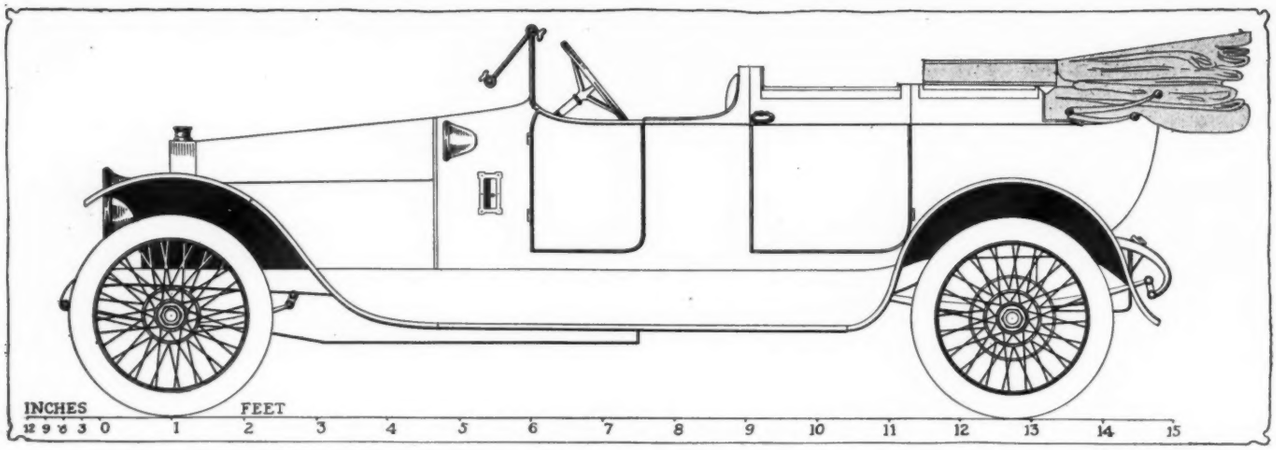

Fig. 1—The cabriolet body mounted on a suitable chassis, and with the top folded back. Note the graceful lines

The Cabriolet—A New Body Type

Is a Fully Collapsible Closed Body Which Is Neat in Appearance Either Open or Closed—Is Rapidly Increasing In Popularity Abroad

By George J. Mercer

FROM the indications of the trend of the body designs that will be seen at the various European shows this year, the cabriolet will be a numerous class. This design has been gaining slowly in public favor for some time. It represents the latest efforts of the best bodybuilders to develop the full collapsible type.

Heretofore the landaulet and the limousine-landaulet with the fore part of the roof stationary, were sufficient for most purposes, but there has been a constantly increasing class of buyers who are insisting on the full collapsible body and nothing else will answer.

The design here illustrated shows a cabriolet design of the latest type and the illustrations present the appearance in both the open and the closed positions as well as the end and plan views, and in addition the working layout of the top is shown in Fig. 4.

This design of body is so new that it was deemed best to show considerable detail of the working parts, as well as the method of operating the top. The fittings or hardware devices used on these tops are patented for the most part, and those used on this design are of English origin. The collapsible top has been a study with British builders for a long time and they have been particularly successful in getting out sensible fittings for this type of car.

This body design is entirely new in this country, but it is bound to become popular, because the closed car is being more and more used as the all-seasons car. In the summer it keeps the occupants clean and free from dust as no type of open body can, and in the cabriolet we have the design that combines the advantages of both the open and closed bodies. It can be converted from one to the other in a very short space of time and with little effort, and its advantage is that in either position it looks the part and there is a total avoidance of that makeshift appearance that is so often the characteristic of the convertible body. Therefore, it cannot but become popular, because it is the body design that the automobile public has been asking for, and it is more nearly getting its wish in this than ever before. It is an open or closed body at will, and is near perfect in either position.

Unlike the full-collapsible landaulet, in this body the top or roof extends over the driver and in a manner that harmonizes with the general design. The roof is not cut in order to fold as in the case of the landaulet, but collapses in a manner similar to the touring car top and with as little difficulty. There is a spring at the back of the rear pillar which assists in raising the top when the weight of the front bows is on it. This spring also helps in allowing the lowering of the top to be gradual when the side joints are broken preparatory to folding down. The operations of raising and lowering the top are very simple and will be explained in detail later.

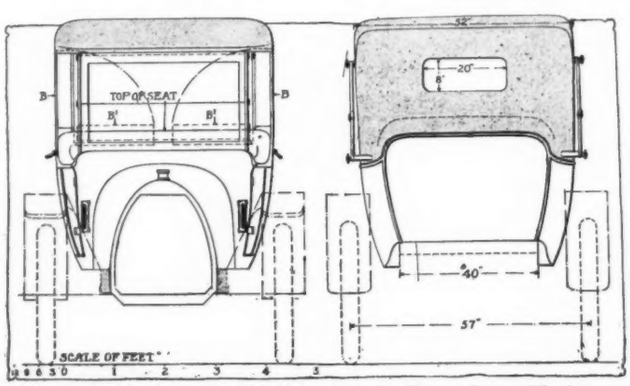

Fig. 2—Front view of cabriolet.

Fig. 3—Rear view with top up

Fig. 5 shows the side view of the body with the top up or closed. The proportions of the body are generous, the windows are large and the doorway is exceptionally roomy. The body is a true flush-side effect with blended hood and cowl. The windshield is made with the visor effect as well as being collapsible as in Fig. 1.

The chassis has left-side

drive with center control and has a six-cylinder motor. The wheelbase measures 140 inches. The center of the rear wheel is 96 inches from the back of the dash, which allows for the large doorway. The wire wheels carry 34 by 4.5-inch tires. There is a tendency toward smaller tires among designers as they make a lower appearance and in Fig. 1 the frame as dimensioned is only 25 inches up. The tread is 57 inches. The gasoline tank is under the frame at the rear.

The body dimensions are ample to allow accommodations for six adults, that is, counting two on the driving seat. The rear seat is only 40 inches wide, room for two, and is due to the body width being only 52 inches outside, as shown in Fig. 6. The quarter glass must drop out of sight in order that the top can fall horizontal, Fig. 4, and, in order for the glass frame to drop its full length and be level with the fence iron when down, it must go nearly to the bottom of the body. To do this, the body can only be as wide at the bottom as the space between the wheels permits while giving clearance without having a cutout or wheelhouse. And, as shown in Fig. 3, the width at the base is 40 inches. This narrow width necessitates the arrangement of the seats as shown in Fig. 5. The seats are the armchair type and collapsible, more freedom being given to the occupants by the arrangement as shown than by placing both in a line. Provision is made, however, to place both facing forward if it is desired.

Fig. 1 shows the body in its open or folded position and as demonstrated it makes a neat and compactly fitting top when down. The overhang beyond the body is within reason and the folded-down pillars and top material are low enough not to be objectionable to the occupant riding in the rear.

Figs. 2, 3 and 6 show the appearance of the car from the end and top views, the essential dimensions being indicated in their respective places. On the front view, Fig. 2, it will be noted that the radiator is smaller than is customary for a six-cylinder car. The modern tendency is to reduce the radiating surface, because it reduces air-resisting surface and it is a generally-accepted theory that as the efficiency of the motor has increased the radiating surface can be decreased. The illustration will allow sufficient area of air space and in addition will permit the maximum sloping effect of the hood and cowl to be worked out harmoniously.

The plan view, Fig. 6, shows the sloping or graduated line carried back to the body line and without any outjutting projections.

Fig. 4 shows the working draft of the folding parts of the top in both the up and down positions as well as indicating the method of operating same. This figure, in conjunction with Figs. 1 and 5, explains all the folding operations.

To explain the folding of the top: Imagine that it is in the position, Fig. 5, and we wish to put it in that shown in Fig. 1. Commencing from the front, the first operation is to unlock the fastener used to secure the top to the windshield. The roof is then pushed back and collapses in accordion fashion, Fig. 4, until it is in the position where it takes up the minimum of space.

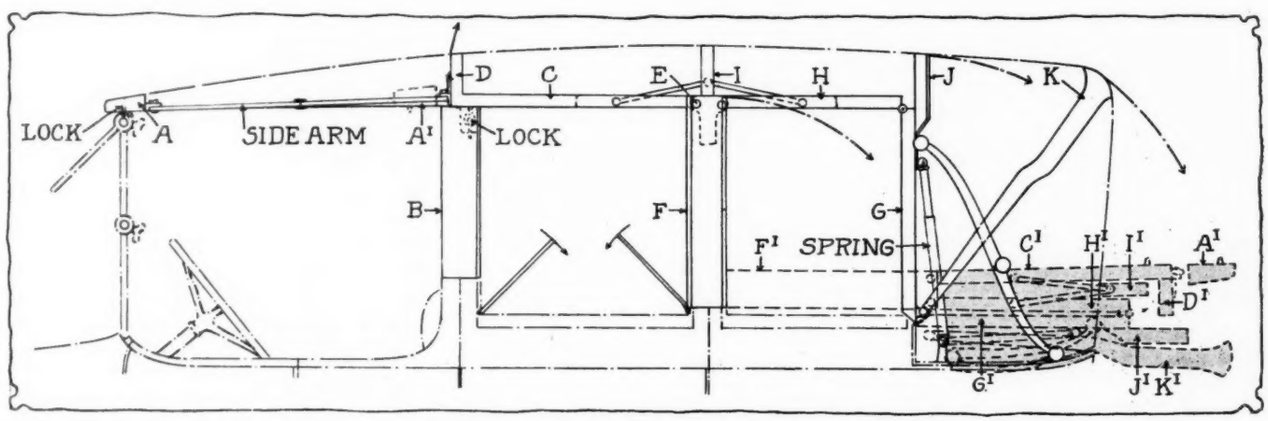

Fig. 4—Side elevation of the cabriolet top, showing the way in which the various parts fold down

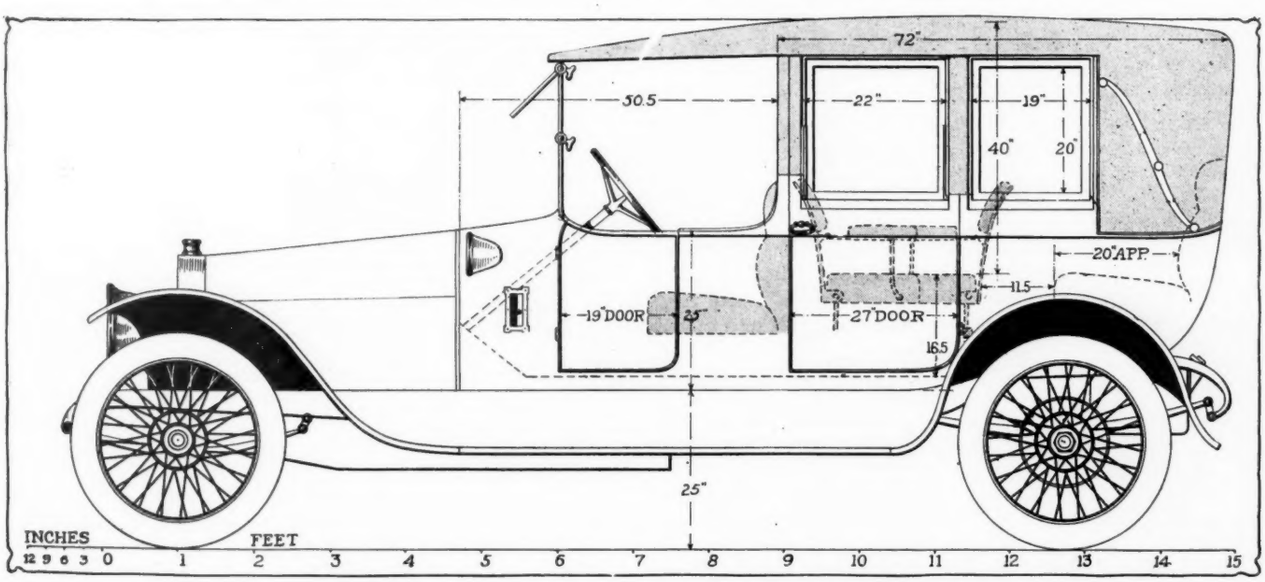

Fig. 5—Side elevation of the cabriolet body type on a chassis, showing the novel seating arrangement

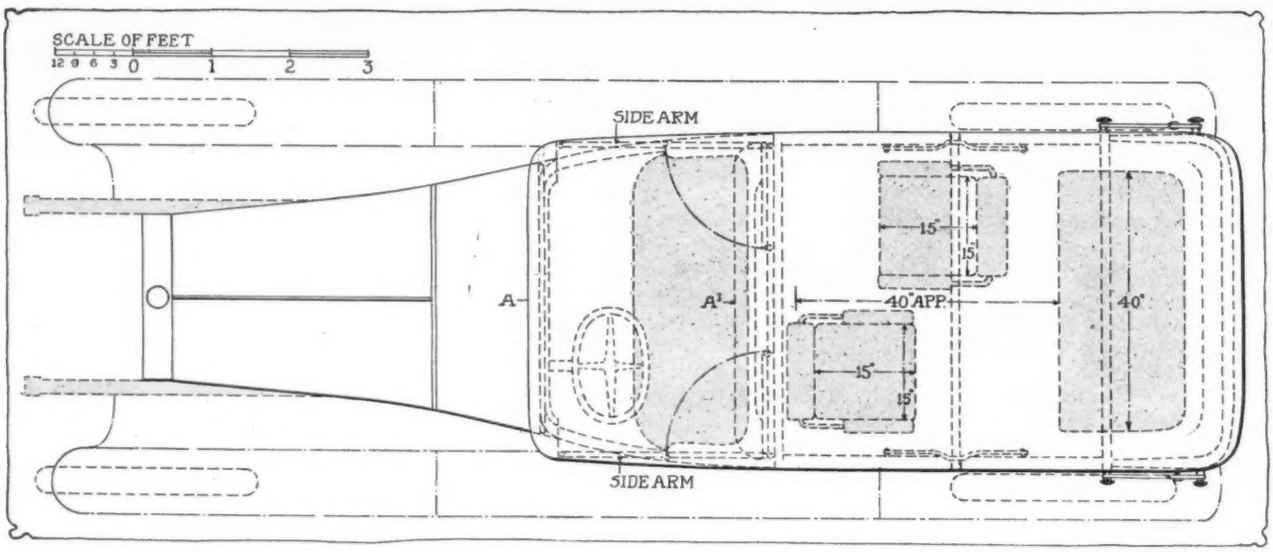

Fig. 6—Plan view of the cabriolet, giving an excellent idea of the graceful lines, as well as the clever seating arrangement

A and A1 show the two positions of the front bow. The side arms, also indicated by name in these views, are simply joints which are pivoted at each end and revolve inwards when the top collapses as indicated by the arcs in Fig. 4. The next step is to release the lock on B, Fig. 4, and to raise the side members C until the pins are free. The pillars B are folded inward as in Fig. 2. B and B1 show the two positions of these pillars. The position B1 shows that the pillar folds down back of the trimming of the seat back until only about 1 inch of the pillar shows above it. Next the top rail C, Fig. 4, to which the bow D is framed solid, is swung upward on its hinge center E. The joint is then broken and the pillars F and G fall at the same time, while the toprail H, which is connected to both pillars, falls with them and assumes its new position without being disconnected. Of course, the length of this toprail must be just right to fit between the pillar ends in both positions. The spring which assists in regulating the falling of the top, as well as assisting to raise same, is a coil spring incased in a tube and the action is obtained by the telescoping of the end when the top is lowered, which amounts to about 4 inches. Then when the top is raised, this allows the spring to force the plunger out and exert a lifting pressure against the pillar. During the operation of lowering the top, the bow I, which is supported by a joint fastening to the inside of the toprail C and H, is raised by the action of these two members and is automatically carried to the down position.

Fine Lines at the Front

The construction of the body is the same as standard practice, the panels being of 16-gauge aluminum sheets and beaten to the required shape, and the framing is of wood throughout. The lines of the body are the straight effect and a very fine combination of lines is worked out at the front, where the hood blends into the cowl. This is best understood by looking at the three views, Figs. 1, 5 and 6. The rear view shows the back with a separate panel effect. This is brought about because it assists in keeping the side lines of the body low and allows the top to fold low when down and the back, on account of being a separate panel from the side, can extend as high as is necessary to give comfort to the seat. Another feature is that, in paneling the back in this way, money is saved both in labor and material.

The pillar construction is of wood and shows wood finish above the belt line. The glass has wood frames and the door-glass is supported by flappers. These are shown in the position of folding in Fig. 4 and the spring lift is also shown on this view.

The finished effect of this car can be just as the customer wishes. It can have the *de luxe* effect and finish or it will look well as a rough-and-ready scout car, depending on the use for which it is intended, but it will lend itself to either extreme. For the top covering leather will make the most up-to-date dressy car, but it will not fold as well or shed the creases like some other material such as Burbank or khahki. If these latter materials are used, the inside of the top is not lined but only the bows covered with the same material. If leather is used the top should be lined with the material that is used for the seats and back.

Cord is Best for Interior

For interior material the most suitable is a cord, having gray as the predominating color. This is a good wearing color and, if the quality is right, will give excellent service. The carpet and the silk for the curtains should match the trimmings in color.

The interior woodwork and glass frames should be mahogany and the metal inside parts nickel or silver finish. It would not be advisable to put a dome light in the roof as it will take up room and knock out the top when down. Corner reading lights might be put in and the other appointments would be speaking tube, toilet case with perfume bottles, mirror and watch to be placed on the front division in the center, a cigar lighter and ash tray and all the pockets that can be put in. A good idea is to put a throw pocket about 9 inches long by 3 inches wide and 5 inches deep under the toilet case and well down.

The trimming is upholstered thick on the back, sides and cushion. This latter is 9 inches deep for the rear and is made flatter on the top than has been the custom of late. Experience has taught that a sloping cushion is very difficult to get up from, especially for a person who is stout. There is a feeling of helplessness that one cannot get out of the yielding upholstery without being assisted to rise and there is a general expression from those who have used a car with cushions that slope very much that the next car they buy must have a more moderate angle to the tilt of the seats.

It is customary to trim all the interior of this type of body with the cloth material and not to use the fancy wood finish, this being confined to the limousine and limousine-landaulet. The interior of the cabriolet is intended to be made comfortable and restful-looking.

The painting scheme is usually a dark gray for the body and a lighter gray for the running gear, with the lamps either nickel or black. If leather is used for the top, then the most suitable color is either a dark blue or dark green and black.

The price of this body fully equipped and mounted on the chassis will be from $1,800 to $2,000 and the weight will be about 900 pounds.

The Engineering Digest

Power Winches Only the First Step To Gain New Fields for Motors

Construction of Winches Used for Hauling Trailers in Emergencies and Other Rough Work — Their Defects. Fresh Inspiration Wanted for Farmers' Traction Problems

CAPACITY in motor trucks for pulling a loaded trailer is a quality which is not demanded for that great majority of this class of vehicles which are to be used for ordinary commercial work but which is urgently wanted for many military purposes which are constantly kept in mind in the technical development of motor trucks in Germany, France, Italy and Spain as well as for work in colonial countries, where roads are precarious and bridges frequently improvised for the occasion and weak, while the scarcity of help, or the need of a convoy for safety in transit, renders it very desirable to make each haul count for a maximum of tonnage. Similar conditions are encountered in the mining regions of the United States, Canada and Mexico and require the adoption of the same means which have been found necessary elsewhere in order to make motor power practicable for the same kind of work. The capacity for hauling a trailer is closely associated with four-wheel-drive construction and other expedients for gaining a maximum adhesion of the traction-wheels to the road surface in conjunction with the widest possible distribution of the load, and the European development goes therefore partly in the direction of perfecting the four-wheel-drive system, against which at present the objection of high construction and maintenance cost is raised. The plan of providing trailers with an electric driving-equipment which takes its current from the gasoline—benzol, kerosene—motor of the tractor truck is also working to the surface again after many previous setbacks but is still met with objections relating to cost and repairs which constitute decisive obstacles for the rough work contemplated, while for inter-urban traffic, wherever this is practical, the difficulties against this plan are only technical.

The simplest and most widely adopted method for securing the desired capacity is based on the experience that ordinarily a motor truck of standard construction can haul a loaded trailer with sufficient speed and without getting stalled or strained and that therefore the most urgent requiment is a device for taking care of those emergencies which nevertheless occasionally arise. This device is the winch and it is connected by a bevel-gear couple and a separate shaft with the gear box of the vehicle, so that it can be switched into engagement with the power of the motor and employed to haul the trailer over difficult places after the tractor truck has been anchored by the brakes or by any means which the landscape affords, such as a tree or stones, chocked under the rear wheels, and which can even be used to first haul the tractor-truck itself backward up a hill and afterwards the trailer. By combining the use of tackle with the winch almost any difficulties can be surmounted, though always with some loss of time, which in the case of a military operation or a caravan of freight vehicles may be very objectionable, the delay in such cases being multiplied by the number of vehicles subject to it. Though for these reasons recognized as a makeshift which eventually must give way to something better or must be reduced to pure emergency service for safeguarding something more thoroughly acceptable, the winch is at present the only fully developed device for the purposes referred to and as such has been mechanically refined for use in the subsidized European trucks.

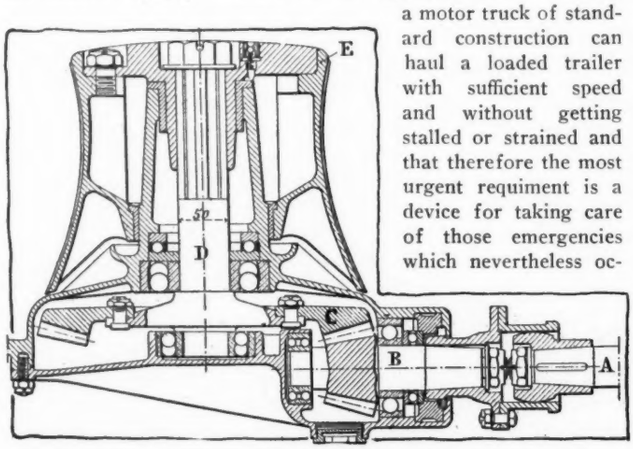

Fig. 1—Type of power winch used for modern motor trucks

An illustration of the type of winch employed in the recent military tests in France is given in *Génie Civil* of August 30 and is reproduced in Fig. 1. A is the working shaft which is connected with the gearbox of the vehicle, B and C the bevel gear, D the motor shaft of the winch and E the concaved metallic drum around which the free end of the traction cable is wound, two or three turns, with a guiding hand at the extreme end, being sufficient for starting.

The Technical Points in Winches

These winches generally functioned satisfactorily at the tests and were found very convenient where the crew had been well trained. In some instances they were criticised for being geared too high and in other instances the concave curvature was defective in shape so as to cause the coils of the cable to climb upon one another instead of sliding off gradually and lodging side by side. In one case the shock occurring by a sudden alignment was sufficient to break the cable. The cables found most suitable were ropes of hemp about 2 inches in diameter, while metallic cables ½ inch in diameter were found more difficult and dangerous to handle, tending to wound the hands of the crew and filling up by use with small metallic splinters.

Problem of Traction Wheels Getting Acute

The question of capacity for hauling a trailer takes another form in the case of agricultural motor machinery, the development of which is now forcing itself more and more strongly upon the order of the day. Here the winch proper is out of question, as its range of action is too small and continuity of work is required. Large pulley sheaves on which endless cables are driven, with these in turn pulling the agricultural tool, take its place, but the real problem to be solved for the average farmer is a driving-system giving ground-adhesion and traction enough, without excessive weight, for pulling a gang-plow through heavy soil at a sufficient depth, the depth being essential for good cultivation. This problem is in principle the same as that which must be solved in order to make the operation of motor trucks for very rough and heavy hauling practicable and economical, and the two fields combined promise a sufficient reward for the overcoming of the mechanical difficulties to engage the attention of automobile engineers in Europe in a marked degree at present, while the results accomplished up to this date are yet meager.

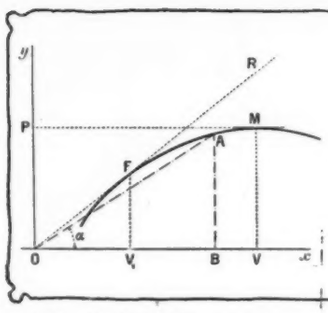

Fig. 2—Renaud's power curve

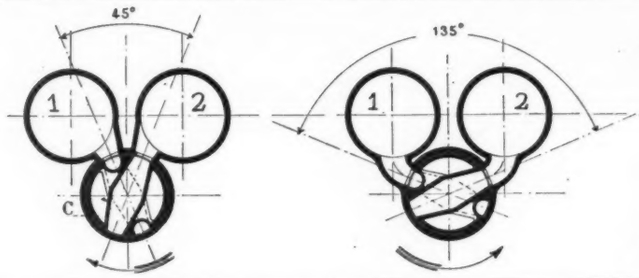

Fig. 3—The change in Itala valve ports

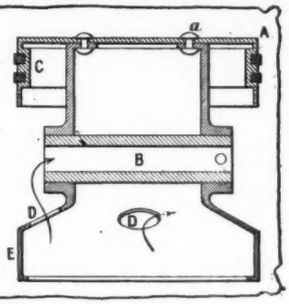

Fig. 4—Very light steel piston

What Heat Does to Outboard Valves

A CHANGE in the Itala sleeve-valve motor of 50 horsepowers, called the Avalve [meaning "no-valve," being a hybrid combination of the Greek *alpha privativum* and the English "valve"] is of general interest for the reasons which prompted it. It is shown in Fig. 3, representing the relations of the rotary sleeve valve to the two cylinders of a group which it serves. The sectional view to the left shows the arrangement in the old model and that to the right the same in the new model. The gas channels from the valve to the two cylinders were only 45 degrees apart in the old model while now they are 135 degrees apart. This change has been rendered possible without affecting the cycle by reversing the direction of rotation of the valve body. With the old arrangement the same valve port served first for one cylinder and immediately afterwards for the other, while now one cylinder is first served by means of a pair of apertures on one side of the valve body and the other by another pair of apertures diametrically opposite. The result is a more uniform heating of the valve body by the exhaust and therefore also a more regular expansion. The old plan made it necessary to provide a play of 3/100 of a millimeter between the distributer valve and its casing and it has now been found practicable to reduce this play to one-half, which is just enough for proper lubrication and obviates the fatal gas leaks.—*Vie Automobile*, Sept. 6.

—

For Hauling Steel, Logs, Poles, Etc.

IN Figs. 5 and 6 there is shown a simple method adopted by Saurer in Europe for facilitating the hauling of very long material by motor power. The difficulty experienced in turning sharp corners with loads of this character, either in narrow city streets or on roads where mire or ditches limit the width, arises from the tendency of the two-wheeled trailer on which the rear portion of the load is supported to make a short cut to follow the tractor truck the moment the latter begins to turn. To obviate this, the trailer axle is usually pivoted, on the fifth-wheel plan, and a man is charged with the duty of turning the axle outward and holding it to a course by which collision with curbs or buildings is avoided. The new scheme consists in fitting the trailer axle with a sheave, or two arcs of a sheave, from which crossed cables are run to the rear portion of the truck, the two ends of the cable being attached there. Naturally the distance between the two points of attachment and the diameter of the sheave must be in certain suitable proportions in order to have the turning of the truck automatically cause the trailer wheels to be turned neither too much nor too little; and the cable must be adjustable to different lengths of the load. The general plan and construction details are shown in Fig. 5 while Fig. 6 shows the effect obtained when turning a corner on a street of a given width—about 19 feet from curb to curb—with truck, trailer and load of given dimensions. The black curve represents the course of the trailer wheels. The dotted curve below it gives the course they would follow without the device or an extra man.—From *Génie Civil*, Sept. 6.

Piston Design of a New Order

AN extra-light piston intended for racing cars is described in British journals. Its construction is shown in Fig. 4. The head A with the piston rings C is secured to a tubular steel stamping of much smaller diameter. This leaves room for reinforced hollow lugs in which the piston pin B is pinned, leaving a large bearing for the connecting-rod. The lower portion of the tube is again expanded to afford the guidance of a trunk piston and the flared wall of the enlargement E is formed with apertures D by means of which the air in the crankchamber gets a chance to cool the upper portions of the piston and the hollow piston pin. This piston is called the Zephyr and is said to weigh only one-half as much as an ordinary pressed-steel piston for a similar bore.

—

Best Total Gear Ratio For Trucks As Explained by Renaud, French Expert

—

Every Type and Tonnage Should Have a Motor of Its Own To Attain Viability of Vehicle—The Great Desideratum. Opinions Affording Mental Exercise for Keen Critics

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WHAT the gear ratio of an automobile should be with reference to any given power curve of its motor, in order to obtain the maximum of flexibility in operation, forms the subject treated by D. Renaud in *Omnia*. The matter is naturally of greatest interest for laying out the gear proportions in motor trucks, the power in this class of vehicles being, as a rule, only slightly superior to the requirements.

It is remembered that the power of a motor at any given moment can be expressed as the product of two factors; one the piston pressure and the other the distance travelled by the piston per second or, in other terms, the torque acting upon the crankshaft multiplied by the speed of rotation per second.

Renaud further recalls the fact that the power curves of different motors necessarily vary because the factors of carburation, ignition, combustion and volumetric efficiency, by which the power is influenced, are themselves influenced differently by variations of the motor speed, according to how the details of the motor have been worked out. But for the unavoidable imperfections in the provisions for getting the same gas mixture, the same spark, the same flame propagation and the same density of the explosive charge at all speeds, the power of a motor could be proportionate to its speed and the power curve could be a straight line, but in reality the power curve of a motor is always somewhat similar to that shown in Fig. 2, indicating that the power goes on increasing at a slower rate than the speed up to a certain point, passes through a maximum and thereafter decreases although the speed is increased. An examination of this well-known curve leads to some interesting conclusions.

As in most motors the speed giving the maximum power is very high but does not give the lowest fuel consumption per horsepower-hour, most builders adopt a lower speed as standard, usually selecting one at which the fuel economy is satisfactory

and the vibrations and stresses moderate. To this speed there corresponds a certain torque which is counted upon for the propulsion of the vehicle.

If the total speed reduction of the vehicle on direct gear has been chosen precisely so as to make the resistance against the propulsion of the vehicle on a level road equal to the torque developed at the wheel rim by the standard motor torque, the motor will of its own accord take the speed selected as standard for it. In point of fact, many builders of motor trucks have preferred to establish the standard motor speed by means of a governor while adopting a rate of speed reduction in the transmission which makes the resistance to traction a little smaller than that which the motor can handle at this standard speed. The governor alone prevents, in this case, all transgression of the maximum speed and, as a rule, the motor does not work with full charges.

In Fig. 2 the speeds are measured on the axis Ox and the powers on Oy. OR is the straight line representing the ideal power curve which is never attained in any motor. M corresponds to the speed V at which the maximum power is obtained, and A to the speed B which is adopted as standard.

Now Look at Fig. 2 Again!

As the torque equals power divided by speed, the motor torque developed at the speed B—representing the standard adopted—equals $\frac{AB}{OB} = \text{tg}\, a$. As Fig. 2 shows, the motor torque increases when the speed is reduced, so long as the angle a can become larger; that is, up to the point when the straight line OA becomes tangent to the power curve at F, to which corresponds the speed V1 at which the motor torque is maximum.

It is just because the torque increases when the speed is reduced that it is possible, with a truck whose total gear ratio has been calculated with a view to making the traction resistance on the level almost equal to the wheel-rim torque at the standard speed, to climb a gentle grade requiring more wheel torque without changing gear or touching the throttle, by virtue of the reduction of vehicle speed which comes of its own accord. On the other hand, if the grade is so sharp as to make the traction resistance superior to the maximum wheel torque—produced by the maximum motor torque—then the motor speed will drop rapidly and it will become necessary to change gear.

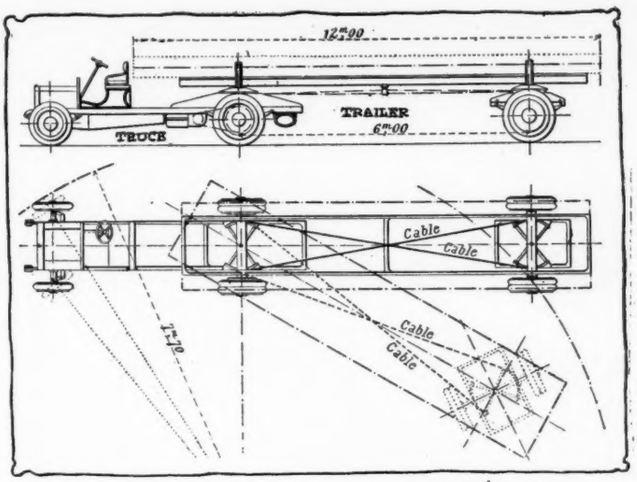


Fig. 5—Cable device for hauling long loads around corners

Word-Formula for Viability of Vehicles

The vehicle thus possesses a flexibility, or self-accommodation to variations of grade or road resistance, which is so much more pronounced the wider the difference is between the maximum torque and the torque obtained at the motor speed adopted as standard. With a power curve like that shown in Fig. 2 this means, then, that it is wise to adopt a standard speed B considerably higher than V1 and that the total gear ratio of the vehicle should be determined in accordance with the selection of speed made.

The majority of the motor trucks which took part in the military endurance tests had motors regulated to a maximum speed of 1,000 to 1,100 revolutions per minute and in which the maximum torque corresponded to a speed of about 800 revolutions, and a great flexibility was noticeable in their operation, even when they were pulling trailers.

As trucks usually require one reduction gear more than is needed in a touring car, it might be thought advantageous, in order to avoid the extra gear, to adopt a motor of a lower standard speed; one in which the standard speed would come close to that giving the best torque but whose dimensions were sufficient for developing the necessary power. By this method it would be possible, since the speed of the motorshaft would be reduced by more than one-fifth, to adopt a rear-axle gear exactly similar to those used for automobiles in general, even with the ordinary shaft-drive. But such a mator would always be inefficient and would always work close to its maximum torque, the vehicle would be totally lacking in flexibility and frequent gear changes would be necessary.

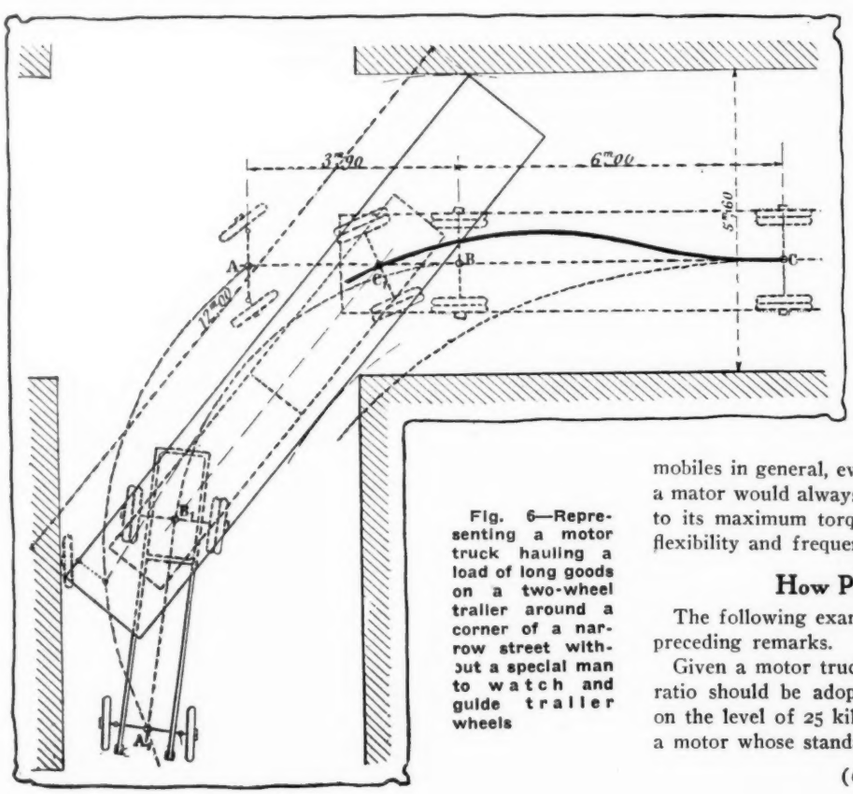


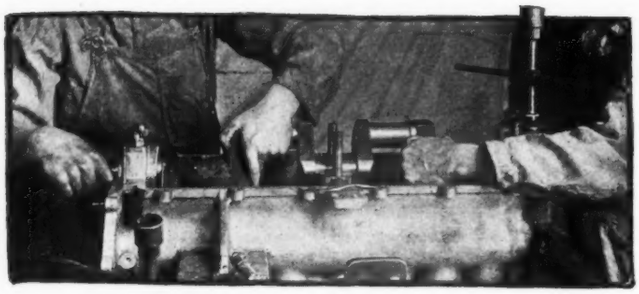
Fig. 6—Representing a motor truck hauling a load of long goods on a two-wheel trailer around a corner of a narrow street without a special man to watch and guide trailer wheels

How Plan Works Out in Practice

The following example will add precision to the import of the preceding remarks.

Given a motor truck weighing, loaded, 7 tons, what total gear ratio should be adopted in order to give it a maximum speed on the level of 25 kilometers per hour on direct drive, (1) with a motor whose standard speed is 1,100 revolutions and (2) with

(*Continued on page* 586.)



The Rostrum

Moist Atmosphere Alters Motor Performance

EDITOR THE AUTOMOBILE:—In your issue of September 11, the views of F. R., a chauffeur of Providence, R. I., were expressed on the change of performance of a car in the damp atmosphere bordering a lake and in the drier atmosphere where the car was submitted to the rays of the sun. I wish to heartily concur in the assertions of F. R., as I have had the same experience myself during the recent cool wave. I noticed that the car was running better at night when the atmosphere was damp and cool than it did during the day, and decided to put my idea to a practical test. A short distance from the garage where the car is kept there is a hill which is just steep enough to compel me to change gears. I had never been up this hill to my knowledge at night and I decided that if I would go up the hill without dropping back to second it would certainly be evidence of the fact that the motor was pulling better than it did on the two or three occasions that I had been on the hill in daylight. To my great astonishment the car climbed the hill without hesitation and the speed never once dropped below 10 miles an hour. To prove that this had been entirely due to atmospheric conditions and not to any change in the carbureter, gasoline, valves, oil, ignition, cooling, or any other factor which could enter into the case, I took the car on the same hill the following day and found that I was again compelled to change gears. I intended to again make a test that evening, but was compelled to give up the idea on account of a sudden shower. I think, however, that the experience that I have had is enough to show that the condition of the atmosphere causes considerable difference in performance. It does not seem to be reasonable to suppose that the mechanical conditions of the motor were such that a difference could be made in its performance through any change in its functioning.

New York City. J. E. S.

¶ *This method of testing, namely that of taking the car on a hill which it can just make on high gear when the motor is in its best condition is a good one in many ways. The performance of the motor on the hill is an excellent criterion of its condition and therefore if the motor is in the same condition on both attempts and it climbs the hill once and not the second time it seems but fair to look to atmospheric conditions as an explanation.*

Dead Point on Ford Lever Causes Miss at One Position

Editor THE AUTOMOBILE:—In looking through THE AUTOMOBILE for September 4 I noted an inquiry on page 430 form Dr. P. T. Southall, Amelia C. H., Va., about starters on Ford cars, also complaints of throttle trouble the car stopping when he moves throttle down to fifth or sixth notch. I have the same trouble on the spark, and I wondered if the Doctor intended to say spark lever. If this is the case, he will find that all Ford cars have a dead point on their spark lever. This is explained in the Ford instruction book, pages 18 and 19, fifth edition 1912.

In conclusion I would like to have you publish, if possible, a method of switching Ford headlights from magneto to battery and vice-versa. Battery is 6 volts, 80 ampere hours; magneto, I believe, is 11 volts alternating current. While this can be done with several switches, I would like to do it, if possible, with one so that there will be no danger of switching the magneto and battery into the same line at same time by reason of forgetting to throw one switch.

Garfield, N. J. E. C. KORNHOFF.

—There is no method which suggests itself by which this switching can be handled in a simple manner. Any installation which would enable you to use the two currents on the same lights would be so complicated that it would be costly and would take an electrical expert to install it.

Intake Tapped for Air Device To Increase Efficiency of Motor

Editor THE AUTOMOBILE:—1—I notice that the intake manifold on my car, a Cole 50 T. C., has a place drilled in it which is evidently meant for the attachment of some device for admitting more air into the manifold when the motor is warmed up. Would you please give me your opinion of such a device?

2—What is the name of the firm that manufactures the "Speedo"?

Grottoes, Va. R. O. CANADA.

—1—The use of air devices on the intake manifold has grown considerably in the last two years and their value when properly operated cannot be denied. Many carbureters have the air attachment directly connected with them so that the proportion of air in the mixture can be regulated at the will of the operator. The average gas engine, as exemplified by the motor in an automobile, uses about thirteen parts of air to one of gasoline. This mixture gives approximately perfect combustion in the motor or comes as near to it as is required for all practical purposes. It is a good pulling mixture and for power purposes does its work well. The mixture as used in the carbureter, however, is often the same when the car is on a hill and needs the power as it is when running at high speed over a level road. The high-speed mixture need not be nearly as rich as that used for conditions where power is required.

It has been noticed that when the car reaches a certain speed if additional air can be supplied with the same amount of throttle opening the car will at once speed up. It is for this purpose that air intakes are provided on the manifold.

2—"Speedo" is no longer manufactured.

Criticises American Automobile Bodies

Editor THE AUTOMOBILE:—As a careful observer of the outward appearance of automobiles, I would like to criticise the present automobile body and put forth reasons why the body illustrated in Fig. 1 is the next logical step in body building.

To the person least interested in motor cars there appears to be a similarity in the general appearance of the majority of American motor cars. Why is it that all our manufacturers continue to build cars so much alike? If the mechanical part of the present day automobile has reached the apex of perfection, why not begin to improve the bodies? All the bodies are nothing more than oblong, upholstered boxes with holes cut in their sides for doors. They still cling to the lines of the antiquated carriage. They have no graceful lines, it being impossible to express them in this type of body, nor is there a graceful union of the motor bonnet and the body, which is essential to the beauty of the car. Instead they are cut in two, spoiling the beautiful, pleasing lines that could be obtained by the accompanying illustration. This type of body cannot be associated with anything but an automobile and this type of body is the only type that indicates what an automobile should look like.

One sits in this car; he doesn't sit on top of it, nor is he riding on a tally-ho. This car looks the part of the aristocrat on the boulevard or on country roads. It has been balanced well, there being no 6-foot motor bonnet, nor a part of the body hanging over the rear axle, producing an undue strain on the rear springs and the chassis. Neither has space been sacrificed, there being plenty to spare, no matter if it is in the back or front of the car one wishes to sit.

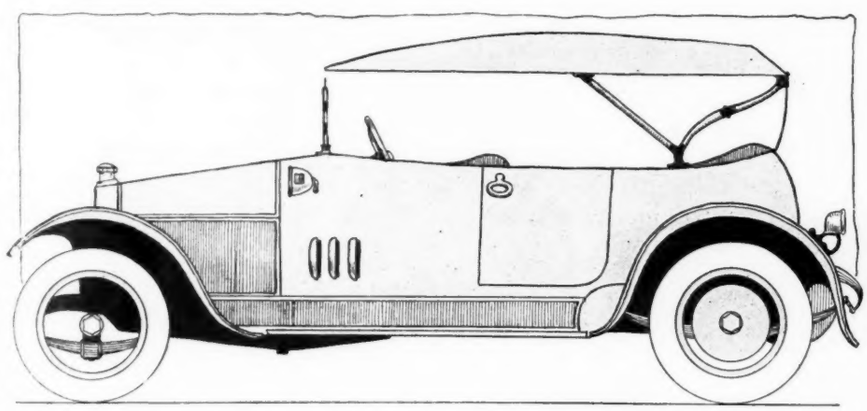


Fig. 1—Type of stream line car suggested by reader as ideal design

The chassis is hung very low, yet with the usual amount of road clearance. The rear springs are unusually long and are underslung and the drive is either shaft or worm. The motor bonnet, body and oval fenders are made of cast aluminum, the ideal material for this kind of construction. The bonnet rises in a straight line from the radiator to the one-piece windshield, making the cowl, dash and the bonnet a complete unit. It also widens enough on each side to meet the body, which is as wide in front as in the rear. The body is slightly wider at the top and the rear is moulded into a graceful oval shape. The seating arrangement is unique. The driver sits in an upholstered seat on the left side, while on the right side is a revolving seat which permits entrance and exit to the driver's seat. There are but two doors and they are unusually wide and near the running boards which are clear and hung below the axles. The rear seat accommodates three passengers comfortably, and, while it is placed a little forward of the rear axle, there is room in the tonneau for two revolving seats because of the long wheelbase. The cushions are tilted and 14 inches thick, the backs having a thickness in proportion to the cushions. The upholstery is put in the body to show only as illustrated. The top is of new design and designed especially for this body.

Gasoline and tools are carried in the rear as well as the spare tires and trunk. The motor has four cylinders, generating the power for the electric lights and starter. It is hung low in the chassis. The front part of the body is ventilated, thus overcoming a great error in the foredoor type of body. The steering column has a pitch of 33 degrees and is on the left hand side with center control. The center of gravity is low, thus overcoming the top-heavy appearances of so many cars as well as preventing skidding which is so ruinous to the tires. Note the rear fenders. Wood or wire wheels are used, the wire variety adding much to the appearance of the car. All trimmings are of polished brass, this finish being much superior to the dull black enamel or the combination black and brass effect.

This car is not radical and can be produced exactly as illustrated. Its beautiful graceful body bears no resemblance whatsoever to any other body yet offered, yet it is strictly an automobile type. I predict that in 5 years this type of body will be common and not until then will the automobile have passed the experimental stage. It is the only logical step in the improvement of the present type of body, and I think will meet with great favor.

Chicago, Ill. JULIAN F. BRASOR.

N. Y. License for 18-Year Old

Editor THE AUTOMOBILE:—Would you kindly let me know whether a person under 18 years of age can get a driver's license in New York State? 2—If so, how is this done?

Mount Vernon, N. Y. J. F. B.

—As you are 18 years old you are permitted under the law of the State of New York to secure an owner's license and therefore to drive your own car, or a car belonging to a member of your family.

If you wish to secure a license as a chauffeur you can also do so at the age of 18 or above. The law upon these points is as follows:

AGE OF OPERATOR.—No person shall operate or drive a motor vehicle who is under 18 years of age, unless such person is accompanied by a duly licensed chauffeur or the owner of the motor vehicle being operated.

LICENSE OF CHAUFFEURS.—Application for license to operate motor vehicles, as a chauffeur, may be made, by mail or otherwise, to the secretary of state or his duly authorized agent upon blanks prepared under his authority. The secretary of state shall appoint examiners and cause examinations to be held at convenient points throughout the state as often as may be necessary. Such application may be accompanied by a photograph of the applicant in such numbers and forms as the secretary of state shall prescribe, said photograph to be taken within 30 days prior to the filing of said application, and to be accompanied by the fee provided herein. Before such a license is granted the applicant shall pass such examination as to his qualifications as the secretary of state shall require. No chauffeur's license shall be issued to any person under 18 years of age.

Calculating Length of Chain

Editor THE AUTOMOBILE:—Would you kindly give the mathematical formula used in calculating the length of chain necessary in a chain drive clutch where the center distance between the sprocket and the diameters of the sprockets are known? There is a formula involving the cosine of the angle made by the chain to the straight line connecting the centers of the

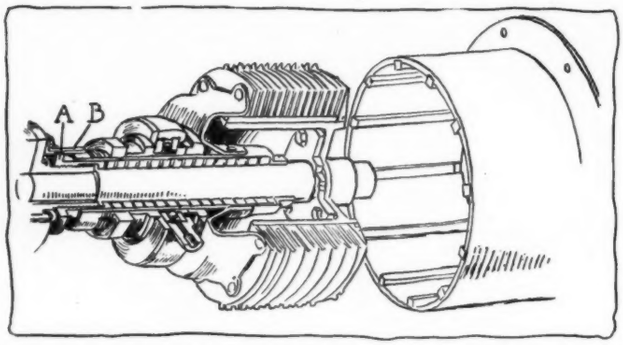


Fig. 2—Assembled view of the clutch used on the Packard 30, 1912, showing the two adjustment features. B is the adjustment collar and A is the locking device holding it in place. As may be seen from the illustration, if it is desred to dismantle the clutch it can be done by removing it from the housing which is located back of the flywheel

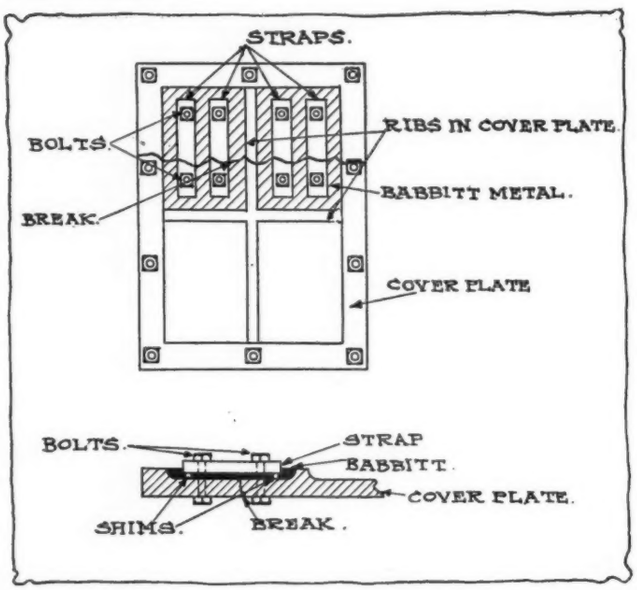


Fig. 3—Diagram showing the use of babbitt in making a repair on a broken gearbox. The metal straps shown in the illustration were used to form reinforcements for the babbitt metal which was run in over the line of fracture. At the bottom of the illustration is shown a section through the repair giving details on position of straps, bolts and babbitt

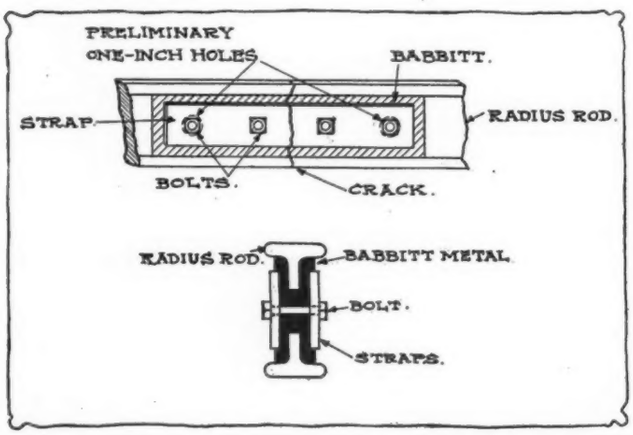


Fig. 4—Diagram of a repair made with babbitt on a broken radius rod. One-inch holes were drilled through the web and 1.5-inch holes through the strap to permit bolting the straps into position loosely. The pieces were then matched, clamped into place and fastened by a babbitt casting

sprockets. It is this formula I would like to have you publish.

Detroit, Mich. DRAFTSMAN.

—The formula which you require is no doubt that given in Vol. 1 of the S. A. E. Handbook on page 14. Referring to Fig. 7,

D = Distance between centers.
A = Distance between limits of contact.
R = Pitch radius of large sprocket.
r = Pitch radius of small sprocket.
N = Number of teeth on large sprocket.
n = Number of teeth on small sprocket.
P = Pitch of chain and sprockets.
$180° + 2a$ = Angle of contact—small sprocket
$180° - 2a$ = Angle of contact—large sprocket

$$\text{Sin } a = \frac{R - r}{D}$$

$$A = D \cos a$$

Length of chain = L

$$L = \frac{(90 - a)\ NP}{180} + \frac{(90 - a)\ nP}{180} + 2D \cos a$$

Grease Gun Makes Handy Funnel

Editor THE AUTOMOBILE:—The grease gun can sometimes be given another use than that for which it is designed, as shown by the accompanying sketch, Fig. 5. On some cars the gearbox is located in such a position that it is under the toeboard and hard to get at from that side. It is also equally hard to get at it by lifting the bonnet. In such cases when it is desired to put oil in the gearbox the grease gun may be used as a funnel by taking out the plunger in the manner shown. Drivers of Hupmobile 20 cars can make special use of this tip.

Another kink which often comes in handy on the road is when an acetylene tank connection rubber will not grip the brass tube. In such a case the leak may be stopped very often by doubling the rubber over on itself as at A, Fig. 6, and then after slipping it on the pipe binding one or two thicknesses of tape around it as at C. Another way of accomplishing the same purpose is to work the tape into a ball B on the end of the tube and then to draw the rubber over it.

Mount Vernon, N. Y. L. T.

Adjusting the Packard 30 Clutch

Editor THE AUTOMOBILE:—Please tell me how to take up on the spring of a clutch of my Packard 30—1912 car? Please give me also an illustration of the clutch and an explanation of the principle upon which it operates.

Wilkes-Barre, Pa. N. G. B.

—A view of the Packard disk clutch is given in Fig. 2. The clutch is mounted back of the flywheel and is inclosed in the extension of the crankcase casting. The drive is taken through two series of plates which are alternately connected with the casing attached to the flywheel and to the clutch shaft. When the plates are in firm contact the drive is transmitted solidly from the casing to the clutch shaft. A strong coil spring holds all the plates together when the clutch is engaged. The plates are faced with an asbestos preparation. The clutch spring on this car should need no adjustment as it is heavy and the clutch surfaces are automatic in their compensation for wear. Very often the slipping in a clutch of this kind can be cured by flushing it out with gasoline. To take up the tension on the clutch the lock A is disengaged and the nut B, forming the clutch spring adjusting collar, is given one turn to the right. The lock is then again engaged.

Babbitt Used to Mend Gearbox

Editor THE AUTOMOBILE:—Babbitt metal, as the writer has several times shown in THE AUTOMOBILE, is a most useful medium for making various kinds of repairs. Take, for example, a broken gearbox cover such as was once brought to my repair shop for splicing together. How the cover was broken I do not know, but I remember that the break was so clean that when the two pieces were pressed together the crack was scarcely visible and the cover looked like one plate.

Many machinists would have spent several hours mating these pieces, machining a smooth surface on the cover and machining smooth straps for splices, and then, after bolting or riveting together the appearance of the job would be nothing to boast about.

It is well to keep the gearbox as dust-proof as possible, hence a repair of this kind should be thorough or the owner of the car should be advised to buy a new cover.

Instead of touching this cover plate with a shaper or planer I matched the break, clamped the two pieces together firmly in their correct position, and laid four 5-inch straps across the crack as shown in Fig. 3, blocking the straps up at the ends with short pieces of .25 inch square iron to permit plenty of room for babbitt to flow beneath the places and form solid bedding.

It happened in this instance that it was unnecessary to build a mold around the pieces to retain the flowing babbitt, the ridges in the casting serving this purpose very handily. Everything was ready, therefore, to pour the babbitt.

Bolts Serve as Reinforcement

The greatest advantage of this method for accuracy lies in the fact that it permits the babbitt to conform itself both to the rough surface of the unmachined cover plate or casing and to the rough straps. After hardening there can be no chance for imperfect rigidity, the straps holding the casting firmly and in the same position as when clamped. The adhesion between the casting and babbitt was not considered great enough to permit omission of bolts or rivets, so, after the babbitt had solidified I drilled holes through the two ends of the straps about as shown in Fig. 3, inserted bolts and screwed them firmly into place. The tightening of the bolts did not disturb the position of the pieces in the least.

Although a gearbox cover needn't necessarily be a thing of beauty, it being hidden most of the time, this particular repair job did not look bad, and it was much quicker than could have been done by any other method. Here the only machining necessary was the drilling of eight holes. Perhaps four bolts would have held it securely, but eight, assuredly, are better than four and the extra time required is practically nil. Fig. 2 shows the repair in section.

Fig. 4 shows a radius rod of a chain-driven car that was accidentally broken by a self-appointed repair man. The break was clean. This I repaired in a manner similar to the cover plate except that here straps were necessary on both sides on account of the greater stresses to which these rods are subjected.

Accurate Matching Is Necessary

I first drilled 1-inch holes through the web of the radius rod and .5-inch holes through the straps to permit bolting the straps into position loosely, the straps being blocked up with thin shims as in the cover plate repair. I then matched the pieces accurately, firmly clamped them into place, and built a bottom mould on which I laid the piece taking care that there could be no leaks. After molding a couple of ridges for the top all was ready to pour the babbitt, which I did, the babbitt first passing beneath the upper strap, through the 1-inch holes and into the lower mould. After the mould was full of babbitt, and hardened, the loose bolts were tightened, two more 5-inch holes were drilled, and two more bolts were added to make the completed mend amply secure.

Fig. 3 shows an elevation and Fig. 4 a section of the radius rod, the section being through the point where the 1-inch hole was drilled.

This repair method is well worth bearing in mind by anybody who is ever called on to mend castings. The writer has used it successfully in repairing castings of irregular shape (usually the strap or plate variety), and the total time required has generally been small compared with the time that would otherwise be necessary.

Brooklyn, N. Y. W. F. SCHAPHORST.

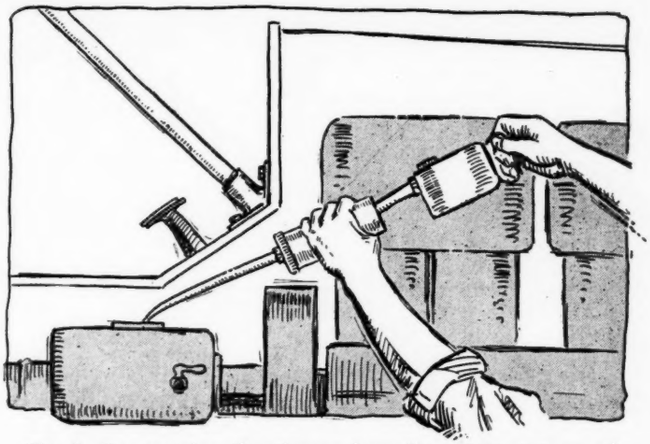


Fig. 5—By removing the plunger from the grease gun an admirable funnel can be formed for reaching the gearbox when it is located beneath the toe board. On some cars it is hard to reach the box by lifting up the floor boards and it is also too far back to get at readily by lifting the bonnet. With the method shown above a long funnel is formed which enables the user of a car having a disk clutch to put oil in the gearbox by simply lifting the bonnet

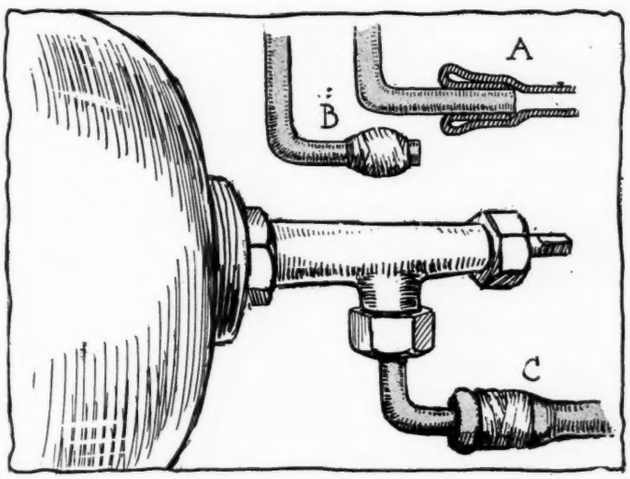


Fig. 6—Very often the rubber connections at the acetylene tank are not firm enough to prevent a small leak about the metal tube. The above illustration shows two methods of preventing this leak. At A, the rubber tube is turned back under itself, thus forming a pipe connection; at B, a ball of tape is wound on the metal tube, over which the rubber can be pulled. C shows the method of A with a piece of tape for reinforcement

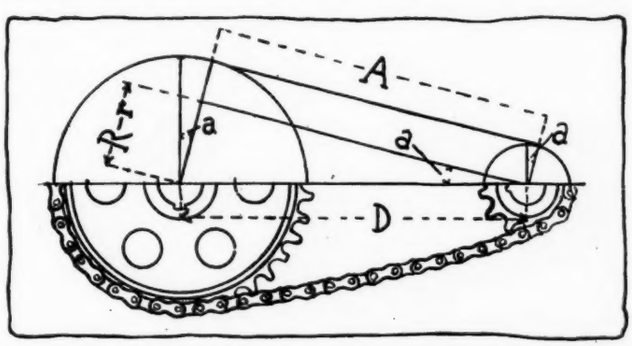


Fig. 7—The length of chain required on a chain drive clutch can be calculated by a very simple mathematical formula which gives far more accurate results than the rule-of-thumb-method often resorted to. It is hard to accurately measure the point at which the chain leaves the wheel, but knowing that the line of the chain forms a tangent to both pitch circles of the sprockets, it may be easily calculated by trigonometry

Four American Chassis Models for 1914

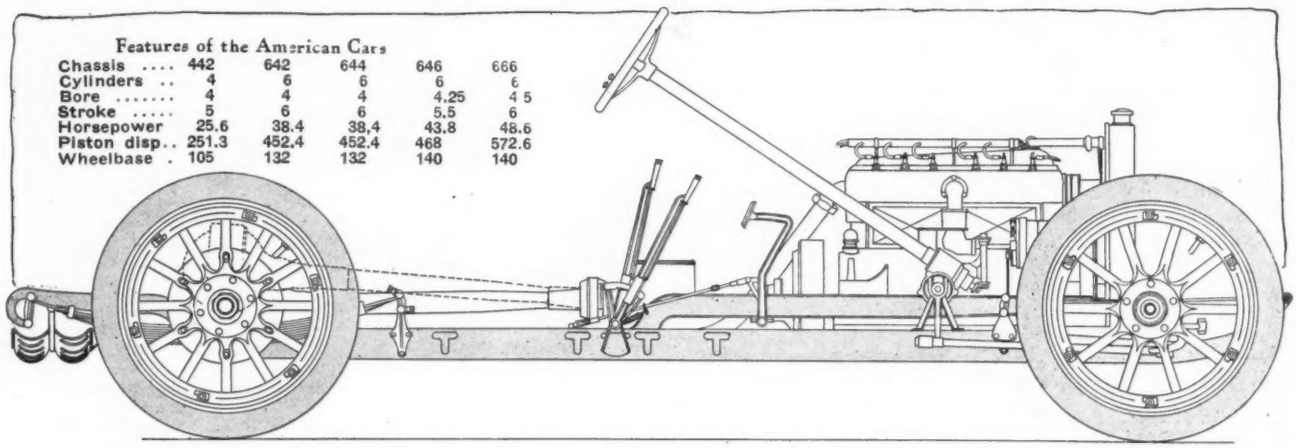


Fig. 1—Side view of the chassis used in the new American 642 and 644, showing the underslung construction and mounting of the motor

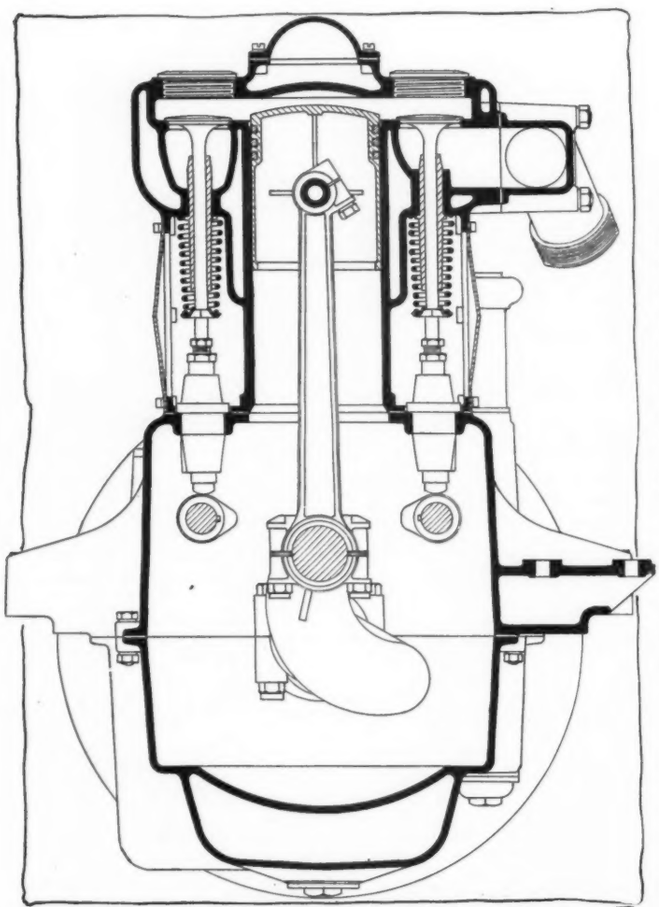


Fig. 2—Section through the American motor for 1914. All motors are of the T-head type, the cylinder being cast in block, with intake valves on the right side and exhaust on the left. Separate exhaust ports are used for each cylinder, the exhaust manifold being bolted on so as to be easily removed. The exhaust ports are at an angle with the manifold and point backward at about 40 degrees. The cylinders are arranged so as to be accessible for scraping carbon from the valve head as well as from the top of the piston and combustion chamber. All valves are completely inclosed as shown in the illustration. The lubrication is by splash for the cylinders and by pressure feed to the main bearings and connecting-rod bearings

Three New Six-Cylinder Types, the Four-Cylinder Scout Being the Only Model Carried Over from 1913

AMERICAN underslung cars for 1914 will appear in four chassis models one which is the four-cylinder model and the other three are six-cylinder models. Previous to its announcement of its first 1914 car last spring the American company had devoted its attention exclusively to four-cylinder cars, but for the next season enters the six-cylinder field with three different models. The model names designate the number of cylinders, the horsepower and the seating capacity. The line includes the 442, a four-cylinder car seating four passengers, which has become known to the motoring public as the Scout and is the only one of the previous season's models which is carried over.

New Sixes of Same General Design

The six-cylinder models include the 642, a two-passenger car, the 644, a four-passenger car on the same chassis, a 646, a six-passenger car which has just been announced and the 666, a six-cylinder of 60 horsepower known as the Big Six. The 642 and the 644 have up to this time been supplied with a 4 by 6-inch motor, but the newly-announced 646 has a 4.25 by 5.5-inch motor and the 666, has a 4.5 by 6-inch engine.

As the new six-cylinder cars are all the same in general design it will suffice to describe in detail the chassis of the new 646. This model has a six-cylinder motor 4¼ by 5-inches giving an S. A. E. rating of 43.8 horsepower, although its nomenclature catalogues it conservatively at only 40-horsepower. Factory tests have shown that, at a speed of 1,750 revolutions per minute, the motor develops 66 horsepower.

The six cylinders are cast in block but with separate exhaust ports for each cylinder, the exhaust manifold being bolted on and easily removed. The exhaust ports are at an angle with the manifold and point backward at about 40 degrees. The cylinders are arranged to be accessible for scraping carbon. The cylinders are of the T-head type with the inlet valves on the right side and the exhaust valves on the left.

Lubrication is by splash for the cylinders and by pressure feed to the main bearings and connecting-rod bearings, the splash level being maintained and the oil pressure kept up by a gear pump, which maintains a pressure of from 2 to 10 pounds and

runs at a little under engine speed. The oil filler and the oil level indicator, which is of the float type, are at the left side of the motor near the front end, while a separate breather is at the rear on the same side.

Provision for Electric System

Electric lighting and cranking is provided for by a base which is cast integrally with the engine base. The cranking and lighting arrangement is by the use of the new double type of Disco installation. It is the two-unit type with both units mounted in one housing. The generator is driven from the pump shaft through a flexible coupling. The claim for this equipment is that it combines the advantages of separate generating and cranking units and yet eliminates complexity.

Cooling arrangements evidence a certain refinement in that the lower water connection from the cylinders to the pump is cast in the upper part of the crankcase. To provide for unequal heating there is an expansion coupling between the water jacket and the crankcase. One of the features of all of the larger American cars is the use of a double water connection from radiators to cylinder, one connection going to each upper corner of the radiator instead of the conventional single connection to the center. The radiator is mounted on trunnions. A unique type of adjustment for the fan belt is provided in the use of a slotted base in the fan pillar by which the whole pillar may be moved sidewise to alter the distance between pulley centers. The timing gears in the forward end of the motor have spiral teeth to give silence.

Pressure Gasoline Feed

Carburetion is provided by a Rayfield carbureter which is hot-waterjacketed. The gasoline feeds by air pressure maintained by a piston pump operated by a

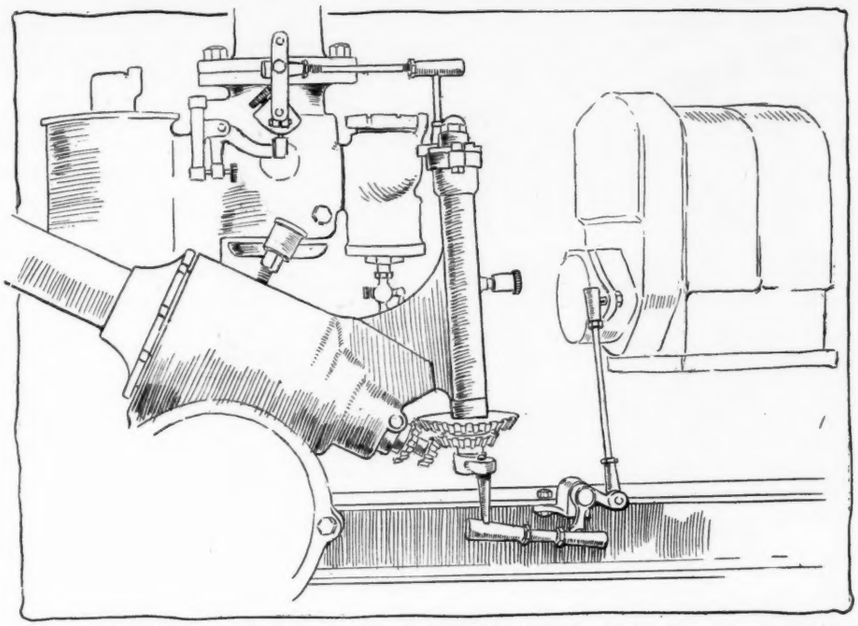


Fig. 3—Magneto and carbureter control connections at base of steering column on the new Americans

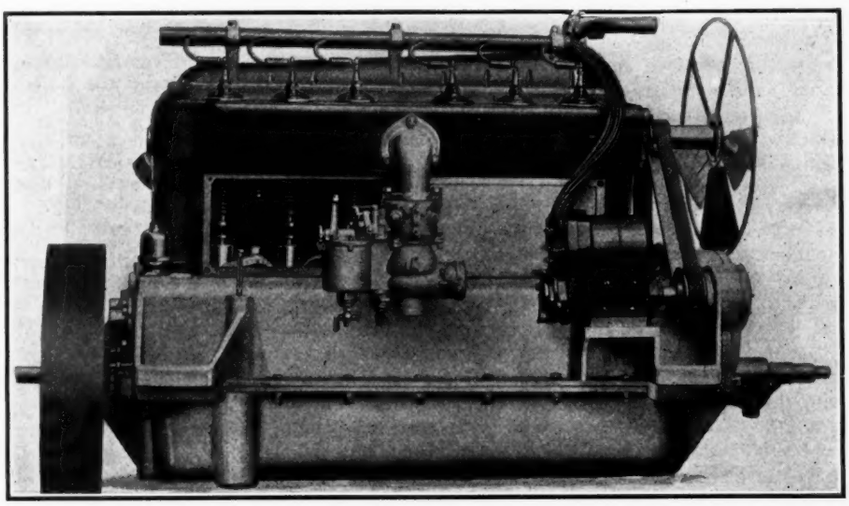


Fig. 4—View of the right side of the motor, showing intake manifold—one cover plate removed

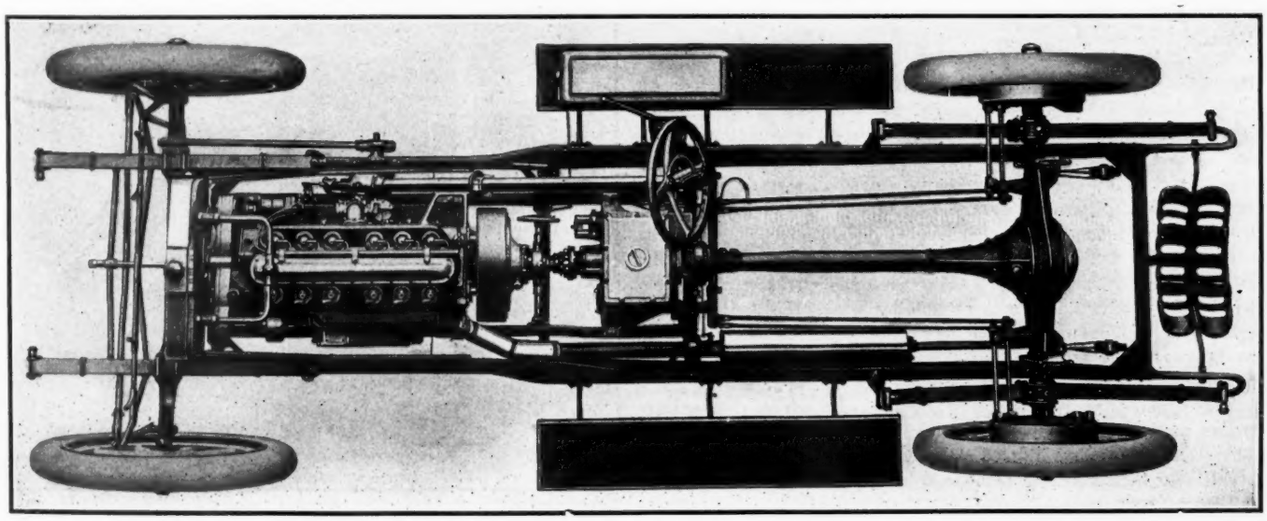


Fig. 5—Plan view of the chassis used in Models 642 and 644 of the new Americans for 1914, showing double water intake on the radiator

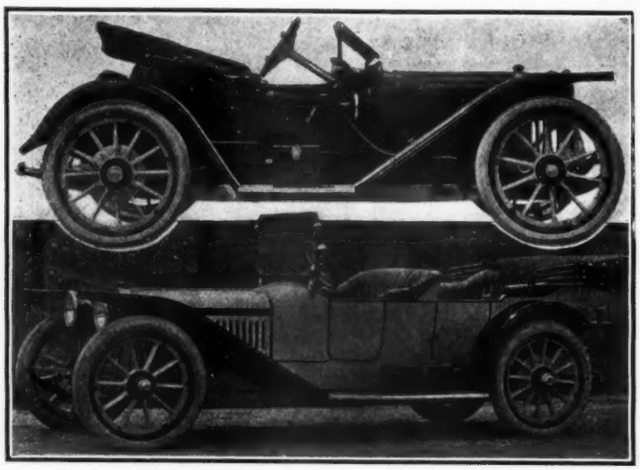


Fig. 6—The Scout, the only model carried over from 1913
Fig. 7—Model 644, a five-passenger type for 1914

separate cam on the camshaft at the rear end of the engine. Ignition is by an Eisemann dual magneto.

The clutch of the inverted cone type is completely inclosed but with a convenient hole for oiling. The cone is 14 inches in diameter with a 2.5-inch Thermoid face. The power plant as a whole is mounted on a channel sub-base. The gearset gears are 1.25 inches face and of chrome-nickel steel, and the gear ratios on the different speeds are as follows: low speed 13.7 to 1; second speed 7.57 to 1; third speed 4.7 to 1; fourth speed, which is direct, is 3.6 to 1. The reverse gear ratio is somewhat higher than low speed, being 18.6 to 1.

Propeller Shaft is Enclosed in Torsion Tube

Power transmission is through a propeller shaft inclosed in a torque tube, the forward ball end of which is covered with a cap threaded into the front half of the cover which is attached to the cross member.

The rear axle is of the floating type, of ball bearing construction. The wheelbase is 140 inches and the tires are 38 inches by 4½ inches. The large tires are used in connection with the American feature of underslung frame to give ample clearance. Brakes are contracting on concentric drums, the service brakes being 16 inches in diameter and the emergency brakes 12 inches in diameter.

Springs are semi-elliptic both front and rear, the forward ones being 40 inches in length and the rear ones 52 inches. The forward springs are equipped with the Ames type of shock absorber. These rear springs are supplemented by Truffault-Hartford shock absorbers.

Right Side Control and Steering Retained

New sixes are conventional in the retention of right-side control and steering. The indicating instruments and switches are located in the toe board. A feature of the lighting equipment which is supplied with a current of 6 volts from the Disco generator is the location of the side lights. These are inset in the windshield baseboard.

A novelty in the equipment is the speedometer installation, in which the speedometer bracket is an integral part of the windshield socket and has a ratchet by which the angle of the speedometer dial may be changed. Another feature of the equipment is the mounting of the electric horn upon the water pump under the hood.

Spare tires are carried in a double pan which holds two spares at the rear of the body.

American 646's are offered either in battleship gray or thistle green, and both combine pleasantly with the black upholstering, dark gray top and black enamel and nickel trimmings.

Similar in every respect to the 646 are the 644 and 642 productions except as to the seating capacity. At present the two and four-passenger cars have 4 by 6-inch motors and 132-inch wheelbases but it is expected before the opening of the year that the two latter body types will be fitted to practically the same chassis as the 646.

A feature of the 642 body is the beetle-back roadster, which has a very speedy appearance, owing to the covered rear compartment which gives storage room for suitcases, as well as covering the gasoline and oil tanks.

As stated above, the 442 which has been known previously as the Scout is the only four-cylinder model retained in the line for 1914, the familiar American Tourist motor of 5⅜ bore and 5½ inch stroke, four-cylinder, being replaced by the newer light six models, particularly the 646 and 644. There has been no change in the four-cylinder model except in the matter of equipment. Addition of an air cranking system and electric lighting generator is the chief change. The air cranker consists of a single-cylinder pump and distributor combined and mounted on the left side at the front end of the motor. It is driven by silent chain from the pump shaft. The distributer sends air to each cylinder in firing order so that no starting motor is required. The pump of 1.5 inches bore and stroke stores the air at a pressure of 200 pounds in two steel tanks which are interconnected. Electric lighting is provided by an Autoliter driven by a belt from the pump and magneto shaft.

Machinery Exports Double in Decade

Exports of machinery from the United States had an enormous growth in the decade ending with 1912. In the year 1902, the total value of machinery exported from the United States to foreign countries was $64,826,000. In 1912, the machinery exports had increased to $176,700. Our largest customers for machinery are Europe and North America. Sixty-five million dollars worth of machinery was sent to Europe in 1912, almost double the amount exported to Europe in 1902. To North American countries outside the United States, $61,000,000 worth of machinery was sent. South America purchased $27,000,000 worth of machinery. The machines which bulk most largely in the export trade are agricultural implements of which $36,000,000 worth were sent abroad in 1912, and automobiles, of which we exported $25,500,000 worth. Other important items in our foreign-machinery trade are engines, $19,000,000, metal-working machinery, $12,000,000, typewriters, $11,000,000, and sewing machines, $10,000,000.—*Engineering News.*

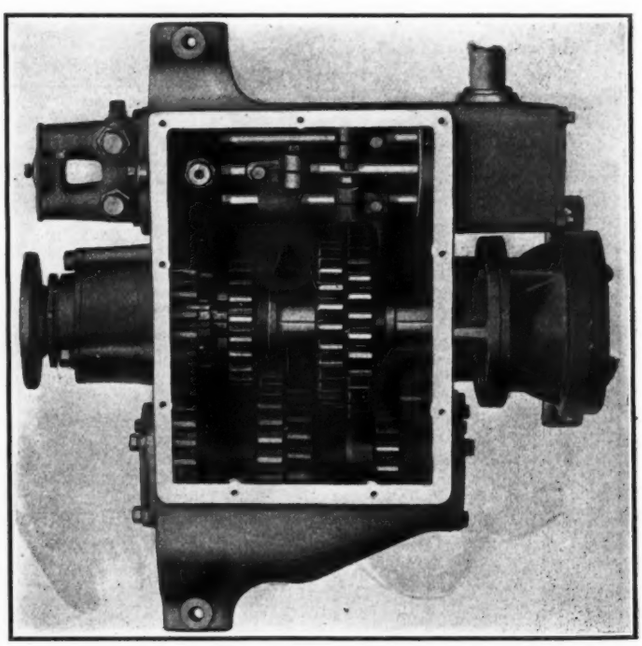


Fig. 8—Plan view of the four-speed gearbox used in models 642 and 644 of the American line for 1914

Among the New Books

Works on Gas Engines, Machinery Design, Electrical Apparatus, Ironfounding and Scientific Subjects Among New Publications

A CONSIDERATION of the new books on subjects of interest to the automobile public reveals the wide scope of the motor car in the commercial field at the present time. Here are books on topics which, at first glance, appear to be absolutely unrelated, yet the man who is searching for information regarding the conditions to be met and the problems to be solved in automobile work finds in each book some helpful knowledge which he can apply to suit his needs. A few of the recently published works of this character are reviewed in a concise but careful manner herewith:

THE GAS ENGINE HANDBOOK by E. W. Roberts, M. E. published by the Gas Engine Publishing Co., Cincinnati. 315 pages, 4 by 7 inches with eighty figures. Flexible leather binding, $2.

As a handbook this work is hardly as satisfactory as it is for the purpose of a text book, although accurate dimensions of parts and empirical formulas are not as plentiful in the work as they should be for the purpose of a handbook, the explanations and descriptions are sufficiently clear to form the basis of a useful text book for the gas engine student.

DESIGN OF ELECTRICAL MACHINERY, Vol. I Direct Current Dynamos, by William T. Ryan, E. E. Published by John Wiley & Sons, New York, 109 pages, 5.5 by 9 inches, illustrated. Cloth, $1.50.

In this work the design of direct current generators is dealt with specifically. In the early part of the work the author leads directly up to the problems of design and then takes up seven different designs with the calculations made on each. The final chapter gives all the calculations necessary on the design of a 300 kilowatt, 90 revolutions per minute, 125-volt direct current generator.

DESIGN OF ELECTRICAL MACHINERY, Vol. II—Alternating Current Transformers, by Wm. T. Ryan, E. E., published by John Wiley & Sons, New York, 117 pages, 5.5 by 9 inches, with numerous engravings. Cloth, $1.50.

This work is intended primarily for the student who is just commencing the study of the design of electrical machinery. The book aims to treat specifically of alternating current transformers and does not depart from its subject to enter any other field. Of special interest are the designs of transformers intended for special purposes which are furnished. There are twelve of these designs, each illustrative of a typical form of transformer. The text, which fills the first fifty-seven pages, takes up the study of the characteristics of different types of transformers and goes deeply into the losses of current through different causes. The designs have all been worked out in the senior class of the University of Minnesota under the guidance of the author.

ELECTRIC MOTOR AND ITS PRACTICAL OPERATION, by Elmer E. Burns, published by the Joseph G. Branch Publishing Co., Chicago, 191 pages, 5 by 7 inches, with seventy-seven figures in the text. Cloth, $1.50.

As the author states in his preface, every engineer who has anything to do with electric motors should not be satisfied with the knowledge of how to make connections and operate the switches but should seek a knowledge of the electric principles involved. This the author has attempted to do in every-day English. By clear sketches the elementary principles are explained in the early parts of the book. No high mathematics are attempted, but throughout the work simple and direct methods of explanation are given in connection with simple black and white sketches. The work should be valuable to the student of electricity who has not had a good methematical foundation. Some of the sketches are a trifle misleading, as, for instance, that on page 40, which indicates the meaning of horsepower by illustrating a horse pulling up a barrel by means of a pulley, nothing in the sketch would seem to indicate that there was a time factor in the unit horsepower.

THE GASOLINE MOTOR, by H. W. Slawson, published by the Outing Publishing Co., New York. 163 pages, 4 by 7 inches. Flexible boards, $.70.

This work is intended to tell the man interested in automobiles or motor boats what the principles of operation of the motor are and how the functions of the different parts are performed. Starting with the motor in general, the author takes up valves, bearings, ignition system, magnetos, carbureters, lubrication and cooling, and explains the relation of one system to another. A chapter at the end of the book is devoted to two-cycle motors. The work is elementary in the full sense of the word and can be readily understood by the average automobilist who has not time to brush up on technical terms.

PRINCIPLES OF IRONFOUNDING, by A. Humboldt Sexton, F. I. C., F. C. S., and John G. Primrose, A. G. T. C., A. I. M. M., published by the Technical Publishing Co., Ltd., London and Manchester, 330 pages, 5 by 7 inches, illustrated by 150 figures. Cloth, 2 shillings and 6 pence.

As the title suggests, this is a text book on foundry work. Properties of iron and the phenomena of solidification are carefully studied before the practical work with the cupola are taken up. Methods of making patents, the laws of shrinkage, etc., are given with much practical advice on the actual casting work. This is a textbook for foundry workmen as well as for the student.

SCIENTIFIC AMERICAN ENCYCLOPEDIA OF FORMULAS, edited by Albert A. Hopkins, Query Editor of *The Scientific American*, published by Munn & Company, Inc., New York City. 1,077 pages, 6 by 9 inches, with 200 engravings. Cloth, $5.

It would be hard to find a more useful compendium of information than that contained in this work. There are over 15,000 useful formulas and processes contained in it. The formulas are classified and arranged so that those relating to kindred subjects are close to one another. Among the twenty-seven chapters there is some which include a series of formulas useful in every household. Among these may be mentioned those devoted to accidents and emergencies, cleaning, household formulas, paints, varnishes, photography and soldering. The complete index renders it easy to find the desired formula or process.

MECHANICAL ENGINEER'S POCKET-BOOK, compiled by D. K. Clark, published by Crosby Lockwood & Sons, London. 704 pages, 4 by 6 inches, with numerous figures and diagrams. Boards, 4 shillings 6 pence.

As the title suggests, this is a handbook designed especially for the mechanical engineer. It is made up in handbook style and is equipped with that most important part of a good handbook, a comprehensive cross index which enables the information to be secured in the quickest possible time.

TECHNICAL SCHOOL ORGANIZATION AND TEACHING by C. Hamilton, published by George Routledge & Sons, Ltd., London. 178 pages, 5 by 8 inches, illustrated. Cloth, 2 shillings, 6 pence.

This work treats on the organization and aims of the technical school. The layout of the school is taken up and the methods of designing a course treated upon. Outlining the work with possible experimental courses and the methods of formulating questions are studied.

RICHARDSON'S ANNUAL ON AGRICULTURAL AMERICA, Sixth Annual Edition, published by Wallace C. Richardson, Inc., sixty-four pages, 4 by 7-inch pages, with numerous illustrations and tables.

This little booklet appears yearly. It is published annually in the interest of agricultural advertising and contains much valuable data regarding farms and their prosperity.

Pierce-Arrow Adds 2-Ton Truck Chassis

Is a Small Edition of 5-Ton Vehicle and Uses Worm Drive with Right Side Control

THE Pierce-Arrow Motor Car Co., Buffalo, N. Y., has brought out a small edition of its original 5-ton truck in the form of a 2-ton vehicle which is intended to fill a large field in the mercantile line for which the 5-ton vehicle now on the market for 2 years has been too large. The plans of the company are to begin the marketing of this new vehicle during the present month.

The new 2-ton vehicle is really a small edition of the larger type in every sense, excepting a few minor details. It uses a four-cylinder motor carried under a forward bonnet, the power of which is transmitted through a leather-faced cone clutch, three-speed selective gearset and propeller shaft with a worm-driven rear axle. The steering wheel and levers are mounted on the right side.

This new 2-tonner is made with a standard wheelbase of 150 inches which permits of carrying a body 126 inches long and 72 inches wide. From the ground line to the top of the frame is 30 inches, and from the ground to the floor 42 inches.

The truck speed is regulated by a motor governor set to operate at 1,050 revolutions per minute, and with this regulation the speeds are 16 miles per hour on direct, 8 on intermediate, and 4 on low. Reverse is 3 1-3.

The chassis is designed to take a total permissible load of 5,200 pounds which includes body weight, so that for a 2-ton paying load there is an allowable body weight of 1,200 pounds. Tires are 36 by 4 inches, solid, all around, singles in front and duals in rear.

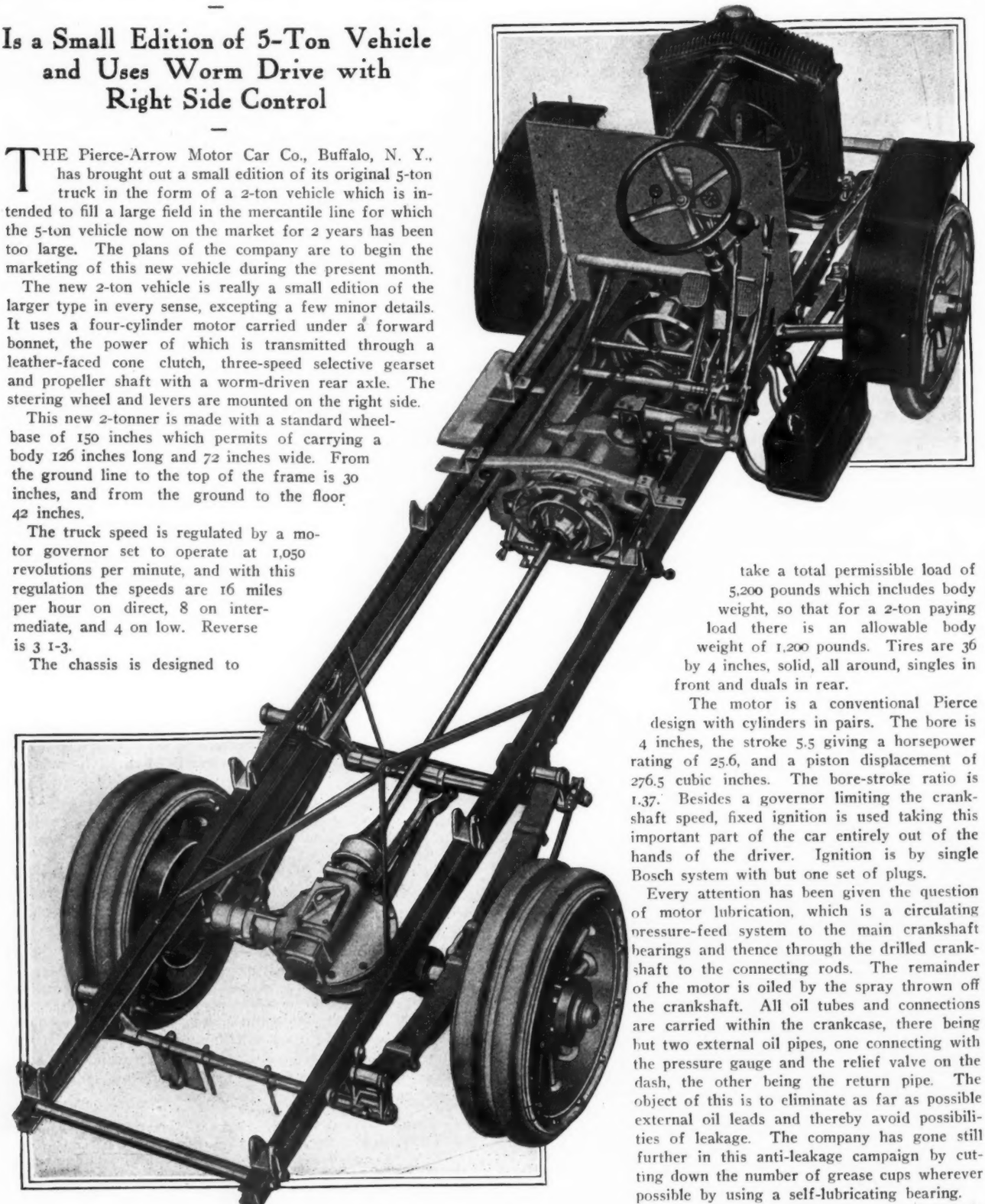


Fig. 1—Partial plan view of the chassis of the new 2-ton Pierce-Arrow commercial vehicle

The motor is a conventional Pierce design with cylinders in pairs. The bore is 4 inches, the stroke 5.5 giving a horsepower rating of 25.6, and a piston displacement of 276.5 cubic inches. The bore-stroke ratio is 1.37. Besides a governor limiting the crankshaft speed, fixed ignition is used taking this important part of the car entirely out of the hands of the driver. Ignition is by single Bosch system with but one set of plugs.

Every attention has been given the question of motor lubrication, which is a circulating pressure-feed system to the main crankshaft bearings and thence through the drilled crankshaft to the connecting rods. The remainder of the motor is oiled by the spray thrown off the crankshaft. All oil tubes and connections are carried within the crankcase, there being but two external oil pipes, one connecting with the pressure gauge and the relief valve on the dash, the other being the return pipe. The object of this is to eliminate as far as possible external oil leads and thereby avoid possibilities of leakage. The company has gone still further in this anti-leakage campaign by cutting down the number of grease cups wherever possible by using a self-lubricating bearing.

A three-point suspension system is used in the motor, it being similar to that of the 5-ton.

Both motor and gearset are mounted rigidly on a sub-frame, this frame being carried on a three-point suspension, a single forward support being a hinged joint to a cross-member of the main frame. At the rear a sub-frame is supported direct to the main frame member. The main frame, as in the 5-tonner, is a pressed steel construction of flexible design using tubular cross-members as shown in the chassis illustration. The Pierce since its inception, has been an exponent of flexible frame construction, as opposed to that excessively rigid frame design used by some truck manufacturers, the idea being that the greater flexibility makes for easier running and longer life.

The worm-driven axle uses the overhead worm as in the other model, this giving a practically horizontal propeller shaft, which, however, is provided with two universal joints. The axle is a floating construction, the steel housing supporting the entire load and the drive shafts transmitting power only to the road wheels. As in the 5-ton model the worm with its wheel is mounted in the cover portion of the housing. There are five teeth on the gear and thirty-nine on the worm, giving a ratio of 7.8 to 1.

The chassis details have been worked out along the same lines as in the larger model. One of the most important being the especially long semi-elliptic springs and having the rear ones shackled at both ends and having the radius rods transmit the tractive effort direct from the axle to the chassis frame leaving the springs free in the suspension role. The torque member is short and placed directly beneath the rear of the propeller shaft. It is supported beneath the tubular cross-member of the frame at a point practically in line with the forward end of the rear spring supports.

Two sets of brakes are fitted. The service brake being a contracting type located in the rear of the gearbox, whereas the emergency brakes are extending types operating in the rear wheel drums.

The chassis equipment which lists at $3,000, includes running gear, tires and mechanism complete, driver's seat, dash and foot boards, front mudguards, side and tail lamps, horn, tools. Bosch magneto, 15-gallon gasoline tank, and metal clips for securing the wood cells and body to the chassis.

Paris Prohibits Steel Tires on Motor Vehicles

COMMERCIAL vehicle owners in Paris have up to the present been singularly free from police and municipal restrictions, there being no speed limit whatever, and practically no limitations as to weight. The new Prefect of Police, after a bold and not altogether unsuccessful attempt to reform traffic conditions, has just decided that heavy motor vehicles with steel tires shall not be allowed in the city after October 15 of the present year, and that the speed of all commercial-motor vehicles shall be limited to 7 1-2 miles an hour.

This measure has been taken owing to the large number of complaints made against the vibration set up by very heavy vehicles running without rubber tires. The street departments, too, have been well aware that certain highways constantly used by heavy steel-shod vehicles have been deteriorated and in some cases shaken to their foundations. The enforcing of this rule with only 3 months notice will be a considerable hardship on many firms. There is at the present time a very large number of motor vehicles in Paris without rubber tires. These must all replace this equipment by October 15.

It would not be surprising if there is opposition to this regulation, in view of the French temperament, and the hardship which the strict application of the law would entail. No disinterested observer can deny that there has been too much latitude with regard to weights and speeds of commercial vehicles in the city of Paris—a comparison with London is sufficient to prove this—but interested parties are not likely to approve the method of reforming by a single stroke of the pen. The German example in regard to a long period of grace for existing owners should unquestionably be copied.—*The Commercial Motor.*

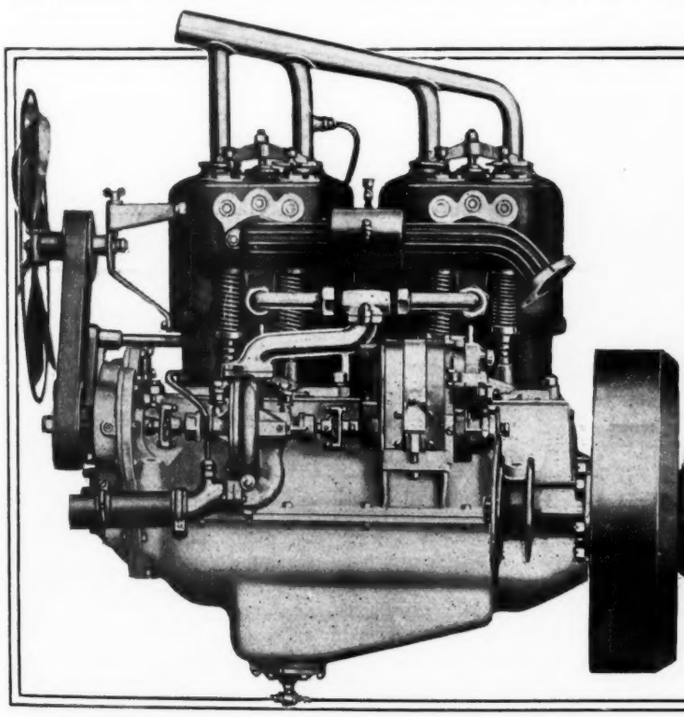


Fig. 2—Left side of motor used on new 2-ton Pierce truck

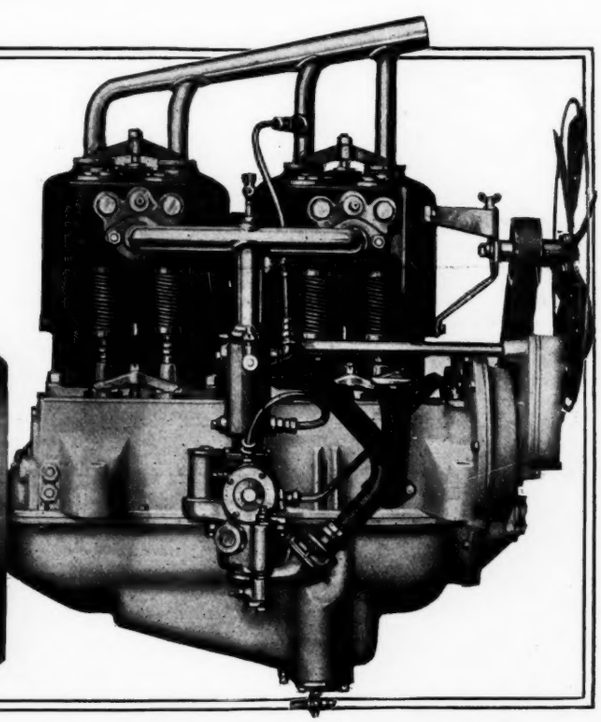


Fig. 3—Right side of Pierce 2-ton truck motor

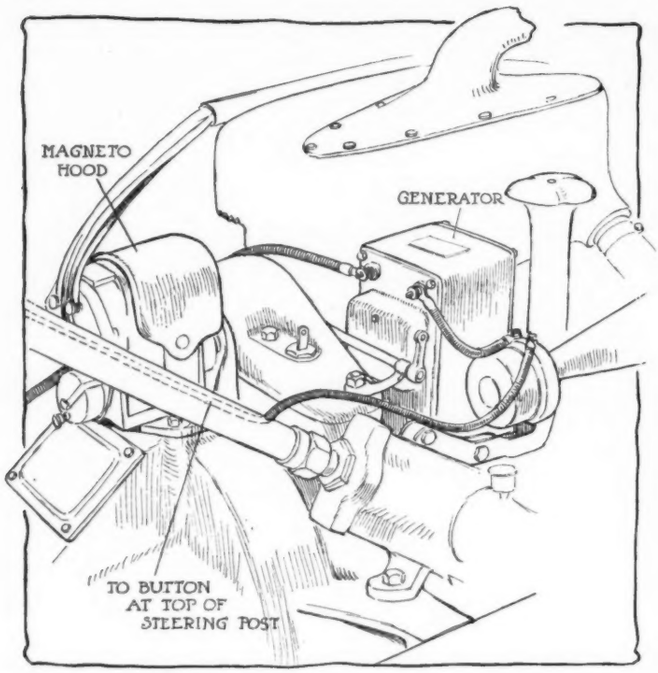


Fig. 1—A view of the Hupmobile 32 motor for 1914, showing the mounting of the generator used in the Westinghouse lighting and starting system as well as that of the magneto and horn. Note particularly the special hood over the magneto designed to protect it in wet weather

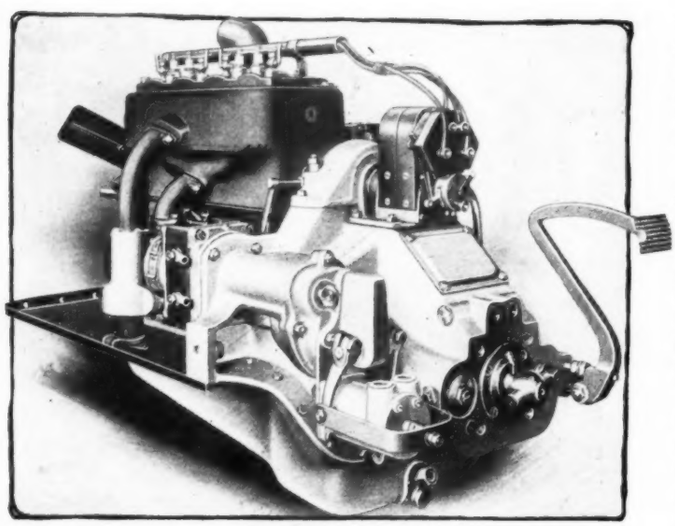


Fig. 2—Rear view of the new Hupmobile engine showing the switch and wiring connections. Note oil pan at base of motor

Features of the Hupmobile 32

1—Westinghouse electric starting and lighting system
2—Right drive with central control
3—Unit power plant
4—Four-cylinder block motor of the L-head type having a bore of 3¼ inches with a stroke of 5½ inches, developing 32 horsepower
5—Crankshaft mounted on three bearings
6—Camshaft driven by silent chain
7—High-tension Bosch magneto fitted with special hood as protection from water
8—Multiple disk clutch running in oil

New Hupmobile Has Electric System

New 32 Chassis Incorporates Westinghouse Cranking and Lighting—Has Center Control for 1914

Four Body Types Furnished for 32 Chassis—Model 20 Runabout Has Minor Refinements

THE Hupmobile line for 1914 makes its bow to the public with very little change in appearance or general construction over that of the previous year. There is a new chassis, this being the four-cylinder model 32 brought out 2 years ago. The smaller model 20 will be continued, which keeps the Hupp Motor Car Co. in the small car field.

Four body types of the passenger variety are fitted to the 32 chassis, these consisting of the roadster, four-passenger car, six-passenger model, and the coupé. All of these are of 106-inch wheelbase except the six-passenger, which requires that the chassis be lengthened to 126 inches,

Spring Suspension Unaltered

All of the characteristic features which have been incorporated in this model 32 from the first are retained. Its rear spring suspension is unaltered, the motor is the same in design, and the unique body design and low-hung appearance are adhered to. Such changes as have been made are principally in the nature of refinements, these occurring for the most part in the bodies.

Mechanically, the greatest difference in the new 32 is in the addition of electric cranking and lighting, the Westinghouse system employing separate generator and electric motor being in-built into the power plant. These additions of course necessitated some alterations of the adjoining parts of the engine. The generator driving mechanism and the gearing between the cranking motor and the flywheel ring gear are all inclosed within housings which are integral with the upper half of the crankcase.

The motor has its cylinders cast in a single block of the L-head type, the bore of 3 1-4 inches together with the long stroke of 5 1-2 inches giving it a rating of 32 horsepower, as the model designation indicates. This rating is greater than that accorded a 3 1-4-inch bore by S. A. E. rating, but the long stroke is accountable for its greater power.

Valves Are All on the Left

The valves, all on the left side, have a clear diameter of 1.25 inch. The stems and springs are well inclosed by cover plates held in place by thumbscrews assisted by a cross-piece between these screws. The valve seats are beveled at 45 degrees.

The intake and exhaust manifolds are cast as a part of the cylinder block, and a single external connection from each conveys the gas from the carbureter or to the exhaust pipe, as the case may be. The crankshaft is mounted on three bearings, which is rather uncommon practice for four-cylinder block-cast motors, the usual construction using two bearings only. The camshaft is also mounted on three bearings. The crankshaft is a drop forging of 40 to 50 per cent. carbon open-hearth steel, heat-treated, and the camshaft is also a drop forging with its cams integral. These bearings are all bushed with phosphor bronze.

The camshaft is driven from the rear of the crankshaft by a silent chain, which is a distinctive feature in that in the average construction the drive is at the forward end of the engine.

Light Piston Used

Pistons are of gray iron and of light weight, each carrying three diagonally-split eccentric rings. The I-beam drop-forged connecting-rods carry the wrist-pins rigidly clamped to them, these pins having their bearings in the bosses in the pistons. They are .75 inch in diameter and extend within each boss about 1 inch. The connecting-rods are capped at their lower ends to the crankshaft bearings by four 3-8 inch alloy steel studs having cotter-pinned nuts.

The principal motor bearing dimensions follow:

Crankshaft—	Front	1 7/16 by 2 inches
	Center	1 15/32 by 1⅝ inch
	Rear	1 9/16 by 3 inches
Camshaft—	Front	1 9/16 by 1 9/16 inch
	Center	1 15/32 by 1¾ inch
	Rear	1 7/16 by 3 7/16 inches
Connecting rods		1 15/32 by 1⅝ inch

The first dimension in each case refers to the diameter.

The ignition is by a Bosch high-tension magneto, singly wired and with a single set of spark-plugs. There is no connection between the ignition and the cranking and lighting system. A new feature is the placing of a "rain shield" over the front end of the magneto. During rainy weather motorists often have difficulty with the ignition system due to water soaking through into the magneto, and the removable cover makes it impervious to such trouble. The magneto position is unusual, this unit being mounted on top of the gearset case. It is also driven by silent inclosed chain from the camshaft. In this location the magneto is kept away from oil and dirt as much as possible, and at the same time is removed from the heated part of the engine. Due also to this position, the magneto extends through the dash, being covered by an easily-removable casing. Thus the driver may get at it from within the car.

Thermo-Syphon Cooling

Cooling is by a thermo-syphon system, the large inlet and outlet connections, together with the 17-inch fan, assisting in the elimination of heat.

The Zenith carbureter is retained, being mounted on the left side of the engine. Air heated by the exhaust pipe is used and the air supply is controlled from the dash.

The lower part of the crankcase has a large apron or flange along its upper edge which extends to the frame on either side, thus making the motor proof against mud and water as much as possible. Being above this apron, the various electrical units are afforded sufficient protection.

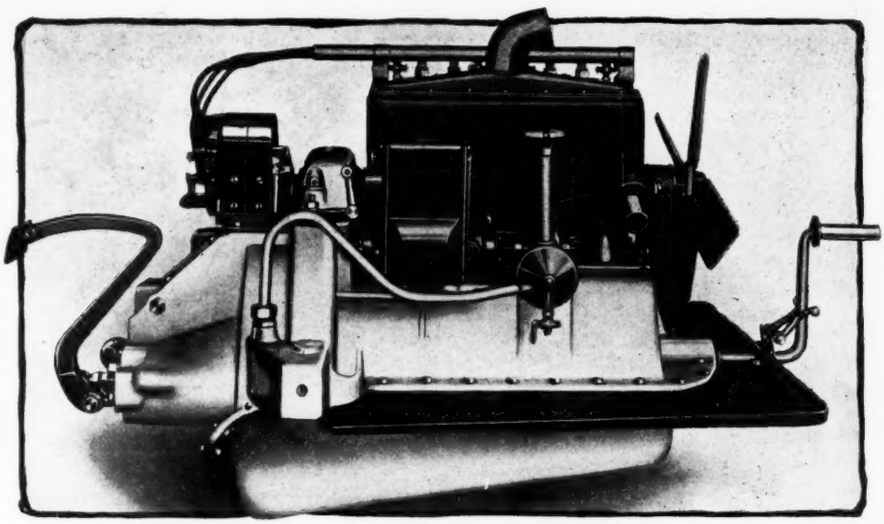


Fig. 3—Right side of Hupmobile engine showing the attachment of the lighting generator and the oil regulator with connection to the crankcase

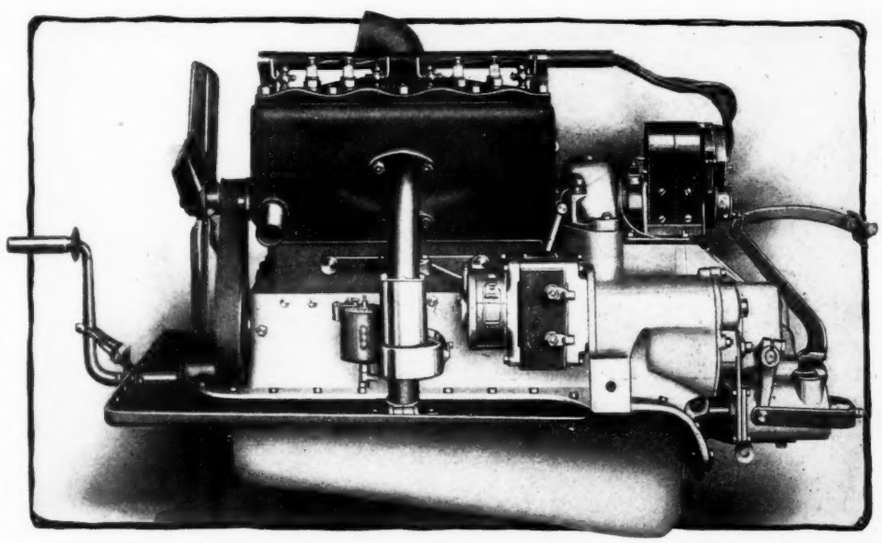


Fig. 4—Left side of the motor, showing clearly the position of the starting motor and that of the carbureter

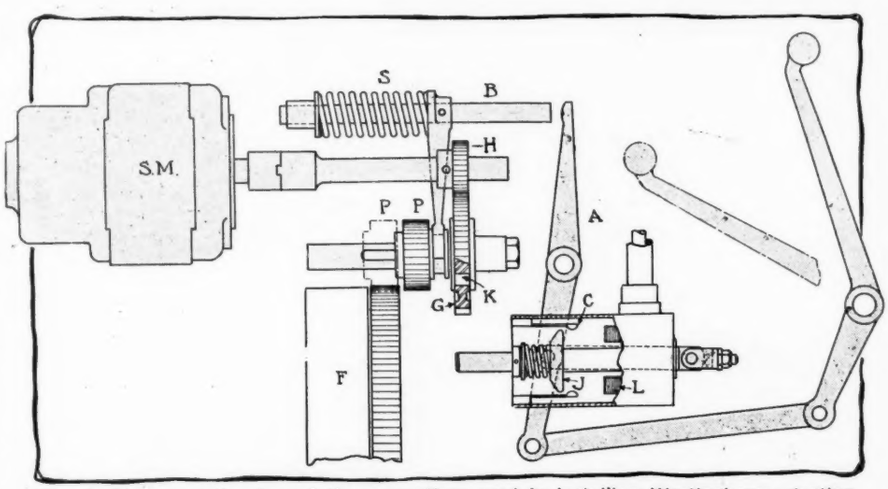


Fig. 5—Diagrammatic view of the connections used in installing Westinghouse starting and lighting system on Hupmobile 32 motor

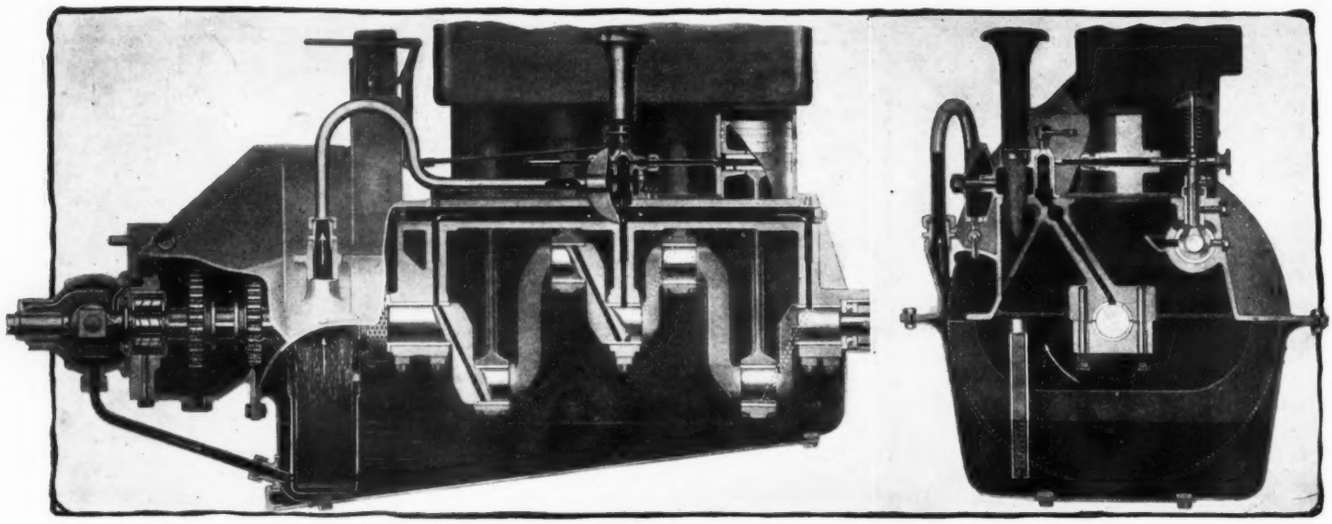


Fig. 6—At the left—Cross-section through Hupmobile 32 motor, showing operation of the oiling system, the flywheel running in the crankcase and carrying oil into the gearbox and also up the copper tube into the oil regulator, as indicated by the arrows. Fig. 7—At the right—End view section of oiling system

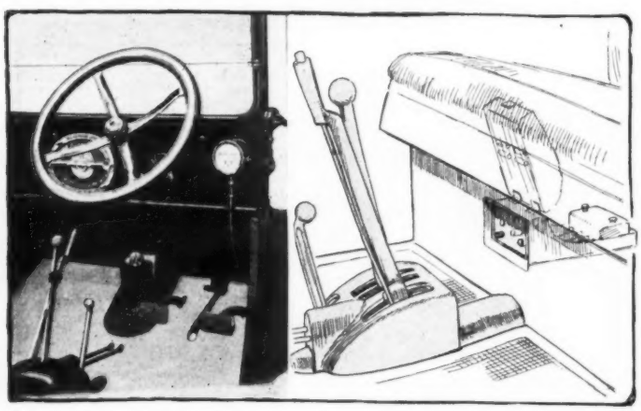


Fig. 8—At the left—Control board arrangement and the new center control on Hupmobile 32. At the right—The new switch showing extra fuses in side of seat cover under seat

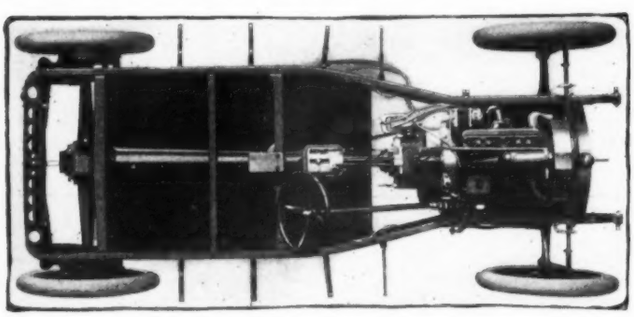


Fig. 9—Plan view of Hupmobile 32 chassis, showing the simplicity and neatness of construction

The oiling system is peculiar to this power plant and appears unaltered in the new models. The bottom of the crankcase serves as the oil reservoir and slopes to the rear. Here there is an oil pan which communicates with the main reservoir by means of holes placed at such a height that any sediment which may collect will not enter. The flywheel rim runs close to the bottom of this oil pan, thus being continuously in a bath of oil. The oil carried up by the flywheel is thrown from it by centrifugal force into a copper tube which conveys it to the oil regulator at the center of the right side of the motor. Thence it is carried through a strainer and into a duct extending along the top of the crankcase. From this duct it is led to the three crankshaft bearings through auxiliary passages .25 inch in diameter. The crankshaft arms are drilled so as to conduct the lubricant from the main bearings to the connecting-rod bearings.

The oil spray thrown from the ends of these bearings is sufficient to lubricate the cylinders and wristpin bearings under ordinary conditions, but to make sure of it oil leads pipe some of the lubricant direct from the main duct to the spaces between the cylinders.

The camshaft is oiled by means of pockets in the crankcase which catch some of the oil thrown off by the moving members.

The oil thrown to the rear from the flywheel goes into the gearset case, and the surplus from here is in turn splashed into a pocket which connects through a tube with the universal joint. Finally the oil returns to the crankcase through a pipe running from the bottom of the universal joint housing to the crankcase. An oil gauge at the rear of the cylinders indicates the level in the crankcase.

Both cranking motor and generator are very neatly incorporated with the power plant. The generator is placed on the right rear of the engine, being mounted somewhat below the center line of the magneto shaft, from which it is indirectly driven by a silent chain through the use of an idler sprocket arrangement.

Starting Device Operates Simply

The cranking motor is carried on the opposite side and drives through gearing meshing with the flywheel ring gear. The cranking device operates very simply, necessitating merely the pushing forward of the cranking lever after the ignition current is switched on. This cranking lever is conveniently placed to the right of the brake and gearshift levers in the center of the driver's compartment.

The cranking system is diagrammatically represented in Fig. 13. Pushing the cranking pedal forward brings finger A into contact with the rod B by means of the pedal linkage. When B slides forward it carries with it pinion P through its yoke arm, meshing the pinion with the flywheel gear, in the position shown by the dotted lines. This same movement of the starting pedal moves the copper ring J in the starting switch, and after the pedal has been pressed down a very short distance J touches the preliminary contacts C and just before the pinion meshes with the flywheel gear. This preliminary contact allows a little current to flow to the starting motor, slowly spinning it through its gearing. Gear H meshes with gear G, which is secured to the same shaft as the sliding pinion P by means of the roller

clutch K, so that the instant the preliminary contacts are made pinion P is set in motion and slides smoothly into mesh with the flywheel gear.

Further movement of the pedal downward brings the copper ring J firmly into contact with the copper ring L, and this sends the full current to the cranking motor, turning the engine at from 150 to 160 revolutions per minute, dependent upon the stiffness of the motor and the condition of the storage battery. As soon as the engine starts under its own power the roller clutch K disengages pinion P and gear G from the cranking motor. However, pinion P still remains in mesh with the flywheel gear to prevent the electric motor from running idle, with consequent speeding up faster than that speed for which it was designed, even though the operator holds the starting lever down longer than necessary. The gear reduction between the cranking motor and the engine is 18 to 1.

The wiring of the electrical system is of the single-wire arrangement with grounded return, with resultant simplification of the circuits. This applies to both the cranking and lighting systems with the single exception that the cranking motor has a full copper return to the battery to minimize the drop in voltage when this unit is operating. Only seven wires are used, one to each lamp, one to the generator and a return wire which connects the generator with the starting switch. The system operates on 6 volts, and the generator is driven at 1.4 times engine speed. A reverse current cutout provides for the cutting in of the battery circuit for charging at car speeds above 10 miles an hour, and cutting it out below 7 miles per hour. Suitable switches take care of the sending of current direct to the lights from the storage battery when the engine is not running at night.

Willard Battery Used

The storage battery, which is a Willard make, of 100 ampere-hour capacity, is located at the forward end of the left running-board just back of the fender. The lighting switches and fuse block are mounted in an aluminum box underneath the front seat, the switch buttons protruding through an opening in the front panel of this seat. This box has an aluminum cover in the top of which are fastened an extra set of fuses for emergency use. The wiring is very neatly done, each wire being inclosed within a flexible conduit and carried in the channel part of the frame to its destination. The lamps themselves are of the conventional nickel and black enamel type, the side and tail lights being of the combination design so that kerosene oil may be used in emergency cases.

Due to the unit power plant construction the clutch and gear-set are housed in unit with the motor. The clutch is a multiple-disk, running in a bath of oil. It is inclosed within the flywheel and has eight hardened and ground steel disks 13 inches in diameter. A part of the clutch assembly is a steel-faced clutch

(*Continued on page* 586.)

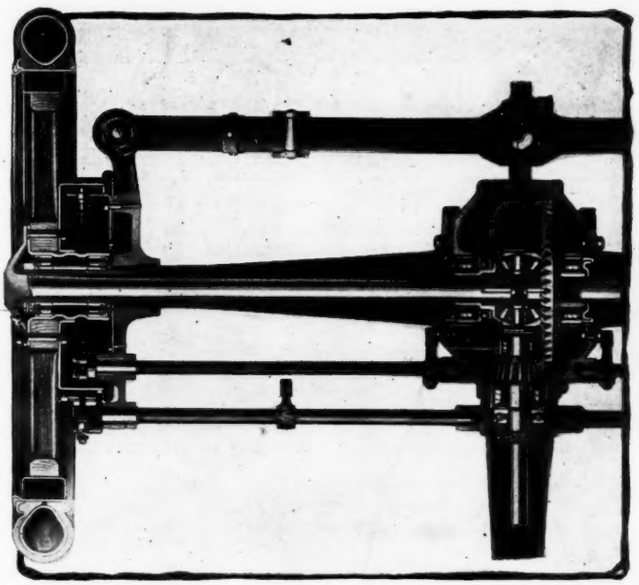


Fig. 10—Cross-section through the rear axle of the new Hupmobile

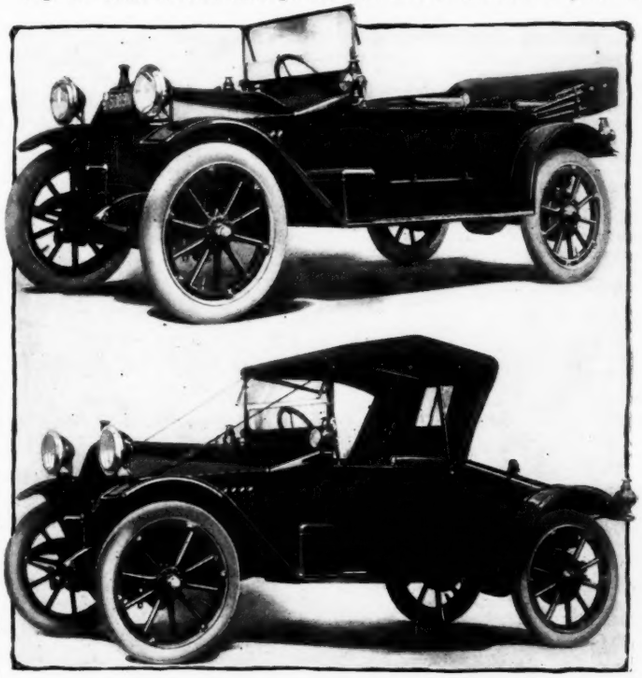


Fig. 11—Upper—32 touring car. Fig. 12—Lower—Roadster

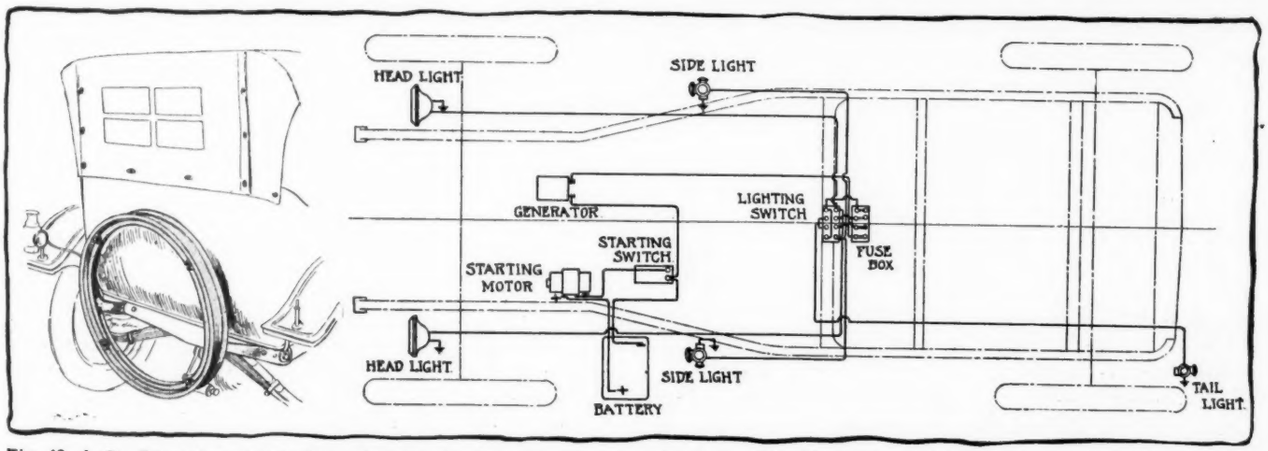


Fig. 13—Left—Rear view of the Hupmobile 32, showing manner of carrying tire. Fig. 14—Electric wiring system used on Hupmobile 32

The Automobile

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"The Paths of Glory Lead But To the Grave"

THE death of George W. Bennett, general manager of the Willys-Overland Company, a week ago, removed from the automobile field one of its most active factors; a personage who breathed the real atmosphere of the industry and who by his far-seeing conception of the possibilities of the field built up a distributing organization that will long endure as a memorial to his ability.

George Bennett was one of the few great men in the last few years, who have been in reality the melting pot of the industry, to see the omni-importance of merchandising methods and general distribution. As production has been the keynote of success during the past 2 years and will continue to be so did he fashion his policies to the varying hour, concentrating at the same time on a single model in place of the multi-model program of a few years ago. In this respect he had reached his zenith, his fondest wish had been obtained, he had seen a one-model campaign begun, a one-model machine put on the market and had added the final touches to a merchandising policy to care for such a situation.

Truly can it be said that "The paths of glory lead but to the grave." "Man who labors from the rising of the sun to the setting thereof and beyond, goes from his hardest labors to his eternal reward."

The example of George Bennett will live. His country-wide policies will be examples to others. His achievements of concentration have shown how success can be built up in virgin fields when older businesses in cultivated lands are going into decline. There is a lesson for every other concern in his work which was but finished when the checkered flag closed the race. His life will serve as an inspiration to others, showing how, when a man gets into his proper place and harmonizes his policies with the great current of public demand, how soon an enormous business can be built up. The regret is that he was not spared to longer enjoy the fruits of his labors.

Stop, Look, Listen

UNDER this title one of the biggest railroad systems in the country has begun distribution of a pamphlet designed to draw the attention of motorists to dangerous, and, in fact, all grade crossings. It is the first time that such an excellent move has been brought to our attention on the part of railroad companies. The numerous fatal accidents of the touring season, which has just closed, have served to impress on railroading interests the necessity of becoming up-to-date. In a word, keeping pace with the progress of today.

Railroad companies are learning that the proverbial "ounce of prevention" is much cheaper than the "pound of cure." But some of the more aggressive railroad companies are going further and are instituting special work in their safety departments for the safety of motorists and others. The work embraces the removal of shrubbery from concealed crossings and mounting bells at other places. Recently one of the most dangerous crossings on Long Island was removed by building a wood viaduct, a work accomplished in a week. From all parts of the country come other examples of prevention that are being carried out.

The Automobile Chamber of Commerce, our national governing body, could well afford to address a memorial to our railroads, drawing their attention to the too numerous accidents of the past few months and recommending preventive measures before the opening of the 1914 touring season. Now is the time to begin such work.

There will be more touring next year than this. There will be a greater percentage of new tourists than ever before. Many of these have yet to learn the lessons of safety. The situation demands the united cooperation of all the motor car makers, the dealers and the motoring organizations throughout the country. This demand for safety crossing facilities is as great as was that for sign boards on our roads 5 years ago. Much can be accomplished if our motorists will only bring the matter forcibly to the attention of the railroad department heads in the territory where the dangerous crossings exist.

The motorists have shown how they can unite on a movement to oppose unreasonable truck legislation, to oppose unfair motor laws or to achieve some highway improvement. To go further, they have united in the political field in not a few cities. Here, then, is a new and worthy cause for union. Let a hundred active and influential motorists go as a delegation to a railroad superintendent over some division with numerous bad crossings, lay the matter before him and in these days of keen competition it will be a certainty that their requests will receive quick attention.

Houk Buys McCue Wire Wheel Plant

Will Use Existing Force of 300 Men To Produce New Detachable Wire Wheel

BUFFALO, N. Y., Sept. 23—George W. Houk, president of the George W. Houk Co., Philadelphia, controller of the American licenses for the Rudge-Whitworth wire wheel, today purchased outright the plant, good will, stock in trade, trade name, trademarks, accounts receivable, and cash on hand, of the McCue company, 1700 Elmwood avenue, of this city, which concern has been manufacturing the McCue wire wheel for upwards of 2 years. The consideration paid is $400,000 together with assuming indebtedness of the McCue company aggregating $38,000.

Mr. Houk takes possession tomorrow morning of the McCue plant and its force of 300 men will continue the manufacture of a new type of wheel developed along Rudge-Whitworth lines and to be known as the Houk detachable wheel. This wheel will be a medium-priced one listing at approximately 75 per cent. of the present price of Rudge-Whitworth wheels manufactured for the George W. Houk Co., Philadelphia.

Mr. Houk's relationships with the George W. Houk Co., Philadelphia, will not be interfered with by this new acquisition, but will continue as in the past the sole American license of the Rudge-Whitworth detachable wheel and will market it as heretofore in the United States from the Philadelphia plant.

The management of the McCue plant will be under a new company known as the Houk Wire Wheel Co., which is at present being organized. George W. Houk will be president, and W. F. Evans, who has been general manager of the McCue Co., will assume the management of the new organization. The capitalization of the new company will be $900,000, of which $400,000 perferred stock has already been subscribed by Buffalo capitalists. The preferred stock will carry a 6 per cent. dividend. The remaining stock $500,000 common is not on the market as yet but may be expected to do so later.

The Houk detachable wire wheel, which will be produced at the Buffalo plant, cannot be looked upon as a successor to the McCue in that it is an entirely different design coming under Rudge-Whitworth patents. It has an internal self-locking device, not unlike that used in the present Rudge-Whitworth wheel.

The present capacity of the Buffalo plant which consists of a forge shop, machine shop, and a recent addition of 160 by 80 for assembly purposes, is fifty sets of wheels per day, which output will be increased to 100 sets per day by January 1. In the Philadelphia plant the present output is fifty sets of wheels per day, which by the first of the year will reach 100.

Post Office To Receive Bids for Motor Accessories for 1914

WASHINGTON, D. C., Sept. 20.—On October 1, at 2 o'clock, the purchasing agent of the post office department will receive sealed proposals for furnishing a large quantity of motor vehicle supplies as they may be required during the year ending June 30, 1914. Intending bidders can secure specifications and blank proposals upon application to Acting Postmaster General D. C. Roper.

Among the articles required are non-skid tire grips, gasoline, machine bolts, grease, bulb horns, brake lining, cylinder oil, blow-out patches, spark plugs, pneumatic and cushion tires, inner tubes, etc. The supplies are to be used to equip and repair the twenty-one Wagenthals and twenty White trucks soon to be installed in various cities.

Post Office Buys Forty-One Trucks

Postmaster General Burleson stated today that forty-one motor trucks have been purchased by the Post Office Department. This is the first time that the use of such vehicles in the postal service has not been secured by contract or hire and officers of the department, as well as manufacturers, are keenly interested in the outcome of the experiment. Twenty of these trucks will be furnished by the White Co., at a cost of $2,060 each. They will be of 1,500-pounds capacity. They have been designed and constructed especially for the needs of the new parcel post in cities. The carriages, trays and hampers are made with a view to carrying the maximum amount of merchandise mail. In addition to delivering parcels the trucks will be used in the regular collection service. The postmasters at Baltimore, Brooklyn, Buffalo, Louisville, Minneapolis and Philadelphia will each receive some of the heavy trucks, which are to be first delivered and will be expected to keep a careful record of the cost of operation and maintenance. These results will be returned to the department and carefully compiled. After charging the purchased cars a proper amount for depreciation and insurance, the total cost will compare with rental expense for twenty cars.

The other twenty-one trucks are lighter machines of smaller capacity for use in small cities and to provide a supplementary service in the large cities that can be used to advantage when the volume of mail for any delivery does not necessitate the use of a heavy truck. They will be furnished by the Wagenhals Motor Truck Co., Detroit, at a cost of $625 each, and will be of 600 pounds capacity.

Henderson Adds $200,000 Capital— Receivership Proceedings Withdrawn

INDIANAPOLIS, IND., Sept. 22.—The financial affairs of the Henderson Motor Car Co. of this city, against which receivership procedings were started last week, have been improved by the addition of $200,000 additional operating capital which has been obtained by the company. In addition to this new capital, three prominent Indianapolis men representing the new funds have been elected to the board of directors, these being Franklin Vonnegut, Arthur R. Baxter, and A. R. Smith. It is understood that a cheaper car carrying the Henderson nameplate will be marketed and if possible kerosene used as a fuel in this new product.

In view of this new capital the receivership which was asked for last week by Archibald M. Hall, who conducts a special machine business, has been withdrawn and a satisfactory settlement of all differences accomplished. The Hall judgment was a nominal sum of less than $1,600.

Duryea Buys Brooks Motor Dept.

SAGINAW, MICH., Sept. 16.—The interests of Charles E. Duryea, pioneer motor car builder, in the Duryea Motor Co. of this city, have purchased the entire motor vehicle department of the Brooks Mfg. Co. which concern was building the Duryea delivery wagon under license. This company was engaged in building, moderate-priced, lightweight, motor truck, employing the Duryea system of cooling, roller drive, and other important features. The Brooks Co. found this business incompatible with its furniture and boat business, and sold out its entire equipment and material which represented an investment of more than $100,000.

Crescent Truck in Receiver's Hands

CINCINNATI, O., Sept. 24—*Special Telegram*—The Crescent Motor Truck Co., Hamilton, O., has gone into the hands of a receiver on application of M. W. Rennyick, W. S. Johnson and Dr. Bundy. Judge Harlan appointed Dr. Bundy to take charge of the affairs. It is alleged that the company is heavily in debt and is losing money. The court is asked to dissolve the corporation, pay the debts and distribute the balance among the stockholders *pro rata*. The company is capitalized at $40,000.

Exports Increase $33,616 in 7 Months

Imports of Cars, Accessories and Parts Drop from $173,261 in July, 1912, to $99,188, in July, 1913

WASHINGTON, D. C., Sept. 22—Figures which have just been compiled by the Export Bureau in Washington show that during the month of July $173,261 worth of automobiles and parts were imported in July, 1912, as compared to $99,188 worth in 1913. For the 7 months ending July, 1912, there were $1,246,649 worth of automobiles and parts imported as compared to $920,377 for the 7 months ending July, 1913. The exports during the month of July, 1912, for automobiles and parts amounted to $1,702,637 and for July, 1913, there were $1,736,253. For the 7 months ending July, 1912, the value of the exports in automobiles and parts was $15,418,172 as compared to $17,760,733 for the 7 months ending July, 1913. The detail tables are given herewith:

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NEW YORK CITY, Sept. 24—The first general meeting of the Automobile Chamber of Commerce to be held, Thursday, October 2, at 10 a. m., will have as its chief work the allotment of space for the gasoline passenger car makers for the Grand Central Exhibition in January. It is expected that approximately 80 members of the organization will take space, approximately two-thirds of the available car space going to the members. This drawing will take place at 12 noon, and at 2 p. m., the drawing for those who are not members will be held. The drawing of the electric passenger makers will not occur as it will be handled entirely by the electric people who have had a certain amount of space given to them.

There will be a meeting of the Motor and Accessory Association directors Thursday, October 16, at which time the complete allotment of accessory space in the Grand Central Palace will be made. It is expected that the date of the annual meeting will be fixed upon. The annual banquet will be held on Wednesday, January 7, at the Hotel Waldorf. At present the applications for accessory space are being made in greater numbers than a year ago. It is understood that some of the accessory people in one or two lines will not exhibit at this show.

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NEW YORK CITY, Sept. 23.—The Michelin Tire Co. has announced a cut in prices for inner tubes approxiamting 10 per cent. and also a cut in casings ranging from 8 to 9 per cent.

Automobile Securities Quotations

A few changes on a higher scale than last week's, occurred in this week's stock quotations. Firestone Tire & Rubber Co., common, rose 10 points, while B. F. Goodrich Co., preferred rose 9 points. Its common, however, dropped 7 1-2 points. The preferred stock of the International Motor Co. rose 8 points while the common of the Ajax-Grieb Rubber Co. rose 5 points.

	1912 Bid	1912 Asked	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co., com	150	..	155	..
Ajax-Grieb Rubber Co., pfd	95	100	95	100
Aluminum Castings, pfd	100	102	97	100
Chalmers Motor Company, com	..	..	100	108
Chalmers Motor Company, pfd	..	..	98	102½
Consolidated Rubber Tire Co., com	13	16	34	36
Consolidated Rubber Tire Co., pfd	50	60	92	96
Firestone Tire & Rubber Co., com	273	276	268	275
Firestone Tire & Rubber Co., pfd	107	109	103	104
Garford Company, preferred	99	100	90	95
General Motors Company, com	36	39	35	37
General Motors Company, pfd	78	81	79	81
B. F. Goodrich Company, com	77⅛	78	28½	29
B. F. oGodrich Company, pfd	106¼	107¼	90	91
Goodyear Tire & Rubber Co., com	330	333	288	296
Goodyear Tire & Rubber Co., pfd	105½	106½	98¼	99½
Hayes Manufacturing Company	..	93	..	..
International Motor Co., com	26½	27½	..	5
International Motor Co., pfd	81	83	10	15
Lozier Motor Company, com	..	..	16	..
Lozier Motor Company, pfd	..	..	..	90
Maxwell Motor Co., com	..	..	2½	3½
Maxwell Motor Co., 1st pfd	..	..	28	31
Maxwell Motor Co., 2nd pfd	..	..	6½	7½
Miller Rubber Company	..	140	133	137
Packard Motor Company, pfd	105½	107	94¼	100
Peerless Motor Company, com	..	..	33	40
Peerless Motor Company, pfd	..	..	87	90
Pope Manufacturing Company, com	34	36	9	11
Pope Manufacturing Company, pfd	73½	75	28	32
Portage Rubber Co., com	..	..	..	40
Portage Rubber Co., pfd	..	..	..	90
Reo Motor Truck Company	10	11	..	11
Reo Motor Car Company	23	25	..	17
Rubber Goods Mfg. Co., pfd	..	..	102	106
Stewart Warner, com	..	..	57	64
Stewart Warner, pfd	..	..	95	97
Studebaker Company, com	42½	44	22	24
Studebaker Company, pfd	94¾	96½	80	84
Swinehart Tire Company	99	101	86	90
U. S. Rubber Co., com	..	..	63½	64
U. S. Rubber Co., 1st pfd	..	..	107½	108
White Company, preferred	107	109	104	107
Willys-Overland Co., com	..	..	67	67½
Willys-Overland Co., pfd	..	..	82	90

To Sell Schacht Company at Receiver's Sale October 20—To Close Factory

CINCINNATI, O., Sept. 23—*Special Telegram*—The entire stock and output of the Schacht Motor Car Co. of this city has been ordered to be disposed of by receiver's sale, the insolvency court of Hamilton County deciding this. The date of sale has been set for October 20 by Receiver Dietz, and it will continue from that date until everything is sold.

The Schacht company was put in bankruptcy some weeks ago and the present determination to entirely dispose of the property is largely due to internal fights among the directors.

EXPORTS AND IMPORTS OF AUTOMOBILES AND PARTS FOR JULY AND SEVEN PREVIOUS MONTHS

ARTICLES, AND COUNTRIES TO WHICH EXPORTED	JULY— 1912 Quantities	JULY— 1912 Values	JULY— 1913 Quantities	JULY— 1913 Values	SEVEN MONTHS ENDING JULY— 1911 Quantities	1911 Values	1912 Quantities	1912 Values	1913 Quantities	1913 Values
Cars, carriages, other vehicles, and parts of:										
AUTOMOBILES—		*Dollars*		*Dollars*		*Dollars*		*Dollars*		*Dollars*
France.....No..	36	31,843	47	33,281	273	326,800	430	333,063	567	429,133
Germany.....No..	22	21,188	132	98,420	73	91,283	252	199,726	761	678,462
Italy.....No..	36	26,795	39	31,932	137	169,914	176	169,252	222	198,300
United Kingdom.....No..	345	230,924	300	232,792	1,875	1,653,995	3,676	2,739,948	2,970	2,250,040
Other Europe.....No..	147	124,672	166	148,275	508	492,222	1,023	859,446	1,298	1,128,107
Canada.....No..	462	686,889	207	348,174	3,724	3,925,265	5,197	6,253,889	4,733	6,289,041
Mexico.....No..	9	14,683	30	39,487	147	258,064	125	183,020	142	255,287
West Indies and Bermuda.....No..	13	12,166	35	33,170	175	210,432	196	208,303	286	286,838
South America.....No..	180	198,798	222	247,544	444	604,229	1,071	1,288,543	1,732	1,963,328
British Oceania.....No..	209	184,034	277	240,734	938	858,196	2,128	1,948,505	1,873	1,827,690
Asia and other Oceania.No..	133	124,086	154	144,472	477	428,119	843	878,678	1,445	1,410,087
Other countries.....No..	43	46,559	155	137,972	164	176,045	378	355,799	1,161	1,044,420
Total.....No..	1,635	1,702,637	1,764	1,736,253	8,935	9,194,564	15,495	15,418,172	17,190	17,760,733
IMPORTS										
Automobiles.....No..dut...	64	155,251	37	81,678	492	1,067,091	467	1,082,301	320	768,521
Parts of (except tires).dut...	.....	18,010	.....	17,510	.....	211,671	.....	164,348	.....	151,856
Total automobiles,and parts of	.....	173,261	.....	99,188	.....	1,278,762	.....	1,246,649	.....	920,377

Market Changes of the Week

There were few changese in this week's markets, the most important and unexpected was the drop in price of domestic tire scrap, which closed at $0.08 1-4 a pound at a loss of $0.01 1-4. Tin was irregular in the foreign market and somewhat unsettled here, but stronger in tone. The principal feature of interest was the pressure to sell spot and nearby tin by dealers in the local market late on Monday, which resulted in a lowering of price to $41.75 a 100 pounds, at a loss of $0.75. Lead was quiet and easy in tone, remaining constant at $4.75 per 100 pounds. Antimony remains dull at $0.07 1-2 per pound. Both electrolytic and Lake coppers suffered drops in prices, the former $0.00 7-20 and the latter $0.00 1-8. Cotton-seed oil suffered a slight relapse in price, when it closed on Tuesday at $7.02 per barrel, at a loss of $0.08.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb...	.07½	.07½	.07½	.07½	.07½	.07½	.....
Beams & Channels, 100 lbs..	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel,							
Copper, Elec., ton 25.00	25.00	25.00	25.00	25.00	25.00		.....
lb.	.16¾	.16¾	.16¾	.16¾	.16 5/11	.16⅜	—.00 7/20
Copper, Lake, lb.	.16⅞	.16⅞	.16⅞	.16⅞	.16¾	.16¾	—.00⅛
Cottonseed Oil, lb.	7.10	7.18	7.40	7.18	7.13	7.02	—.08
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, Brown.	.33	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gals.....	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime.	.95	.95	.95	.95	.95	.95	.....
Lead, 100 lbs....	4.75	4.75	4.75	4.75	4.75	4.75	.....
Linseed Oil.....	.52	.52	.52	.52	.52	.52	.....
Open-Hearth Steel, ton.....24.00	24.00	24.00	24.00	24.00	24.00		.....
Petroleum, bbl., Kansas crude..	1.03	1.03	1.03	1.03	1.03	1.03	.....
Petroleum, bbl., Pa., crude.....	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined.....	.68	.68	.68	.68	.68	.68	.....
Silk, raw Italy...	....	5.30	....	....	5.30	5.30	.....
Silk, raw Japan.	....	4.32½	....	....	4.32½	4.30	—.02½
Sulphuric Acid, 60 Baume.....	.90	.90	.90	.90	.90	.90	.....
Tin. 100 lb.....42.50	42.40	42.20	42.00	41.75	41.75		—.75
Tire, scrap.....	.09½	.08¼	.08¼	.08¼	.08¼	.08¼	—.01¼

Nyberg Company Goes Into Receivership—the Factory Affairs To Be Closed Up

INDIANAPOLIS, IND., Sept. 24—*Special Telegram*—Frederick Vannuys, State Senator, has been appointed receiver for the Nyberg Motor Works, Anderson, Ind., in the Circuit Court at the city on a petition filed by the National Exchange Bank of Anderson. The property is said to be worth $150,000 to $200,000 and the liabilities to be approximately $90,000. The company suffered considerable loss in the March flood and has had to pay cash for material. The receiver has been ordered to take an inventory and close the affairs of the company. John C. Teegarden has been named receiver for the company also by United States Court on a petition filed by B. & B. Mfg. Co., Apple Electric Co., and the Gibson Auto Co.

Wants to Sell Federal Chain Co.

SPRINGFIELD, MASS., Sept. 22.—The trustees of the bankrupt estate of the Federal Chain & Mfg. Co., of this city, has filed a petition asking that he be authorized to sell at private sale the portions of the bankrupt's estate specified in his petition, and further that a hearing upon the petition be held in this city on October 3 to permit the creditors to show cause why such a petition should not be granted.

Firestone Earns $15,000,000 in Year

NEW YORK CITY, Sept. 23.—The gross earnings of the Firestone Tire & Rubber Co., Akron, O., for the fiscal year ending July 31, amounted to approximately $15,000,000. For a similar period ending July 31, 1912, the gross earnings were $11,500,000. For the fiscal year ending July 31, 1913, the net profits were $1,600,000 and the surplus for the year $1,250,000. According to the balance sheet the current assets of the company were $7,000,000.

INDIANAPOLIS, IND., Sept. 22—F. G. W. Sudrow, who, for the past year has been identified with the Marion Motor Car Co. in the capacity of sales manager, has been made division manager for Marion cars in the southern states.

Hamilton Heads Racine Body Company

L. R. Smith Elected President of Milwaukee Co.—Burr Elected President Electric Interests

RACINE, WIS.—The personnel of the new management of the Racine Mfg. Co., Racine, Wis., one of the largest body building concerns in the west, is announced as follows: President, C. A. Hamilton; vice-president, Charles F. Barndt; secretary, Harold Smith; treasurer, F. J. Kidd; directors, Faustin Prinz, W. F. McCaughey, Frank K. Bull, M. E. Walker and the officers. Mr. Hamilton is general manager and Mr. Barndt factory manager. As reported several weeks ago, Mr. Bull resigned as president and George W. Jaegers as treasurer and manager because of other heavy interests and successors were selected with a view to carrying out a new policy which will mean an extensive enlargement of the business. The company is capitalized at $800,000. Three years ago almost the entire works were destroyed by fire, causing heavy loss because of the small insurance carried. The works were rebuilt and have again reached a point of pre-eminence in the motor car body manufacturing industry. Mr. Barndt, the new vice-president, comes from Toledo, O. and Mr. Kidd is a New York man.

A. O. Smith Co. Holds Elections

MILWAUKEE, WIS., Sept. 19.—At the annual meeting of the stockholders and directors of the A. O. Smith Co., held in this city today, the following officers were elected: General manager, L. R. Smith: vice-president, C. S. Smith; secretary, E. M. Smith; treasurer and assistant secretary, James L. Sinyard; assistant treasurer, Jos. J. Stamm; sales manager, James L. Sinyard. Directors: L. R. Smith, C. S. Smith, E. M. Smith, James L. Sinyard, and John P. Kelley.

L. R. Smith succeeds his father, the late A. O. Smith, as president. Mr. Smith has been associated with the company since its organization and his plans are to continue the policies which have been followed up to the present.

Burr Heads Electric Car Makers

CLEVELAND, O., Sept. 20.—Louis E. Burr, president of the Woods Motor Vehicle Co., Chicago, was elected president of the Electric Automobile Manufacturers' Association, at their annual meeting recently held in this city. The total list of officers elected is: President, Louis E. Burr, Woods Motor Vehicle Co.; vice-president, R. C. Norton, Baker Motor Vehicle Co.; secretary-treasurer, F. B. Dodge, Ohio Electric Car Co., and Executive Committee, G. D. Fairgieve, Anderson Electric Car Co.; H. H. Rice, Waverley Co., and C. F. L. Wieber, Rauch & Lang Carriage Co.

Hart-Kraft Co. Fails To Find Buyer

YORK, PA., Sept. 22.—A second unsuccessful effort was made this week to dispose of the Hart-Kraft Motor Co. at public sale, but there were no bidders. The property was offered as a whole and started at $30,000. It was announced that the property can be purchased at private sale from Attorney Donald H. Yost, the receiver. A previous attempt to dispose of the plant at public sale was made on August 12.

Electro Light and Starter Embarrassed

INDIANAPOLIS, IND., Sept. 20.—The superior court at Indianapolis has appointed Fred I. Tone receiver for the Electro Light and Starter Co., in a suit brought some time ago by a creditor. The company has been embarrassed from lack of funds for current operations but believes that the embarrassment will be only temporary and that full settlement can be made with creditors.

Tobin Whichway Signal Co. Bankrupt

NEW YORK CITY, Sept. 23.—Schedules in bankruptcy of the Tobin Whichway Signal Co., manufacturer of automobile lamps, 48 Walker street, show liabilities of $26,711 and assets $2.433; consisting of stock, $1,255; automobile, $500; patent trade mark, $105; accounts, $518; insurance, $50, and cash, $5.

Peugeot Wins Small Car Race in France

Stutz and Anel Enter 1914 Speedway Race—Savannah Races in Doubt—Phoenix Desert Course Rough

PARIS, FRANCE, Sept. 22.—*Special Cable*—Georges Boillot, the racing hero of Europe for this year, won the 387-mile road race today over the Boulogne circuit for cars with a piston displacement of 183 cubic inches, 3 liters in the French classification. As usual, he drove a special Peugeot and sent it the distance over a 32-mile circuit at an average of 63.2 miles per hour, a new record for this distance with so small a car.

Second place was taken by his teammate Goux, this year's Indianapolis hero, who averaged 61.7 miles per hour and who might have been a winner had he not lost the cover to the float chamber in the seventh lap when he was leading the field and had been leading it during the fourth, fifth and sixth laps. This delay put him back in third place and from this time on he was not able to overtake the flying Boillot and contented himself with a neck-and-neck fight with Lee Guinness on a Sunbeam, who got ahead of him when he had the carbureter trouble. He chased the Sunbeam from the seventh lap to the eleventh, the scond last one in the race before he passed him. To do this he made the eleventh lap, 32 miles, in 29:33, an average speed of 64.9 miles per hour, but he eclipsed this figure in the twelfth lap which he made in 29:17, a speed of 65.5 miles per hour, thus finishing in second place.

Guinness' Sunbeam Averages 61.4

Guinness drove his Sunbeam consistently from start to finish, averaging 61.4 miles per hour, being but 2 minutes slower than Goux for the entire distance.

Of the seventeen cars to start, only seven completed the entire distance, these being:

Car	Driver	Time	Av. Time
Peugeot	Boillot	6:07:04	63.2
Peugeot	Goux	6:16:03	61.7
Sunbeam	Guinness	6:18:05	61.4
Vauxhall	Hancock	6:58:18	55.3
Peugeot	Rigal	6:59:44	55.2
Alda	Tabuteau	7:52:34	49
Anasagasti	Avary	8:07:25	47

Two American cars competed, these being Bucks. Repusseau, driving one of them, cracked a cylinder in the fourth lap and withdrew. The other, driven by Drouillet, skidded in the second lap, severely injuring a spectator.

It was apparent from the start that the Peugeot team was going out to win. Consequently, when Goux set the pace in the opening lap, averaging 61.8 miles per hour for the circuit, with Boillot second, it at once became a question of endurance, the Peugeots having more speed than the others.

Rigal, driving the third Peugeot, lost 3 minutes at the start with a slipping clutch but completed the race without making a single stop. When 2 miles from the finish the throttle control came off and lost him fourth place. Resta, driving a Sunbeam, missed a turn early in the race and went out. Chassagne, driving another Sunbeam, abandoned the race in the sixth lap when he was running in fourth place. The brake seized, locking a wheel. Watson, in a Vauxhall, withdrew in the last lap with an overheated cylinder.

The Delage, Schneider and Koecklin entries failed to start.

Today's course presented varied road conditions, the fastest portion being a 7-mile straightaway. One leg is very winding and on the homestretch is a 10 per cent. grade for 1 mile. The circuit of 32 miles and, with its twelve laps, is an ideal one for testing the stamina of racing machines.

Hoosier Speedway Reduces Entry Fees $300

INDIANAPOLIS, IND., Sept. 20.—The entry fee for the 1914 500-mile race has been reduced from $500 to $200 per car and 50 per cent. of this fee will be refunded for all cars that start in the May 30 race. The management is further insisting that all steering knuckles and tie rods must be new 2 days before starting the race and aluminum steering wheels will not be permitted. Frame hangers and steering mechanism shall be subject to the approval of the speedway mechanical engineer, and cars failing to meet approval will not be allowed to start. All drivers, including relief drivers, must furnish a certificate from the speedway surgeon, proving that they are physically fit to engage in such a contest and that they are entirely free from any serious nervous manifestations or other disorders which might prove a handicap. Physical conditions justifying the refusal of such a certificate will bar drivers from the race The race will be limited to cars with a piston displacement of 450 cubic inches.

A purse of $50,000 will be offered, this to be divided into ten purses, the first prize being $20,000. The Wheeler-Schebler Cup, the Remy Grand Brassard and Trophy and the Prest-O-Lite Trophy will also be offered again, the Wheeler-Schebler Cup going to the entrant of the car which is first at 400 miles, the Prest-O-Lite Trophy being won by the entrant of the car which is first at 300 miles while the Remy Grand Trophy will be awarded to the entrant of the car which is first at 200 miles. The driver of this car will receive the Remy Grand Brassard, and if Remy ignition is employed, the driver will receive $50 a week for twenty consecutive weeks. If the car wins the first 400 miles is equipped with a Schebler carbureter, $1,000 in gold will be given the driver by F. H. Wheeler, president of the Wheeler-Schebler Co. Cars entered in the race must have a piston displacement which will not exceed 450 cubic inches and a minimum weight of 1,600 pounds.

Anel and Two Stutz Cars for Speedway

INDIANAPOLIS, IND., Sept. 24—*Special Telegram*—William Thompson of Battle Creek, Mich., has entered an Anel and the Stutz Motor Car Co., Indianapolis, Ind., has entered two Stutz racers in the 500-mile Speedway.

No Grand Prix and Vanderbilt Cup Races?

SAVANNAH, GA., Sept. 20—The Savannah Automobile Club has announced, although not yet officially, that there will not be any Grand Prix and Vanderbilt Cup races this year. A conference was held between the club and the Hotel Men's Association on plans for insuring the success of the meet. One plan was for the hotel men to purchase enough tickets to guarantee gate receipts. Another plan was that they should retain one-half the entrance money of the cars and that the other half of the entrance fees be returned to the makers. Both plans were rejected. The club is still rigid in its determination not to refund entrance fees and not to pay freight on cars entering the races.

Bad Roads for Los Angeles-Phoenix

PHOENIX, ARIZ., Sept. 20—The races from Los Angeles and San Diego to this city, which have been combined this year, will be over poorer roads than formerly according to those who have recently traveled over the routes. The Los Angeles-Phoenix road is in bad shape most of the way as the result of the summer rains, the roads being badly cut and filled with ruts. County authorities are looking after improvements but the course will be no boulevard, as may be imagined.

Oldfield, Speed Hero, Sets New Mile Mark at Detroit Meet

DETROIT, MICH., Sept. 22—That Detroiters would support a motor speedway was evidenced again by the unexpectedly large crowd of race fans who braved yesterday's chill to witness the races which were a part of the Michigan State Fair held here last week. Fully 10,000 people were on hand to see Barney Oldfield, Louis Disbrow, Eddie Hearne and other race stars perform on the dirt track.

The race meet was scheduled for both Saturday and Sunday afternoons, but the events of the first day had to be canceled on account of rain which made the course a sea of mud. It was none too dry on Sunday, but the drivers managed to make some speed. Oldfield, in a Christie front-drive clipped 52 seconds from the State Fair dirt track record for a mile with a flying start, while Disbrow, in a Simplex, drove to a new record for 5 miles on a dirt track in a free-for-all. He made the distance in 4:24.25. Oldfield's time for the mile was 49.48 seconds.

Disbrow negotiated the mile in the second best time, making it in 50.80 and 50.86. None of the other drivers succeeded in bettering 52 seconds in these time trials. Disbrow made the best time in the two heats of the 5-mile race for class E cars, going the distance in 4:38.46 and 4:33.61 in his Simplex.

It is stated that the best previous time for a 5-mile free-for-all on a dirt track was made by DePalma at St. Paul, when he went the distance in 4:29. Heineman in a Case was second in this event, and Hearne, also driving a Case, was third. In this race, which was the best of the day, Chandler in a Mason, ran into the fence, but was uninjured.

A novelty race in which the cars were required to run 2 miles, change a tire, and then go another mile went to Hearne in 3:33.11. The Jay-Eye-See was on hand and in it Disbrow was unsuccessful in his attempt to lower the State Fair track record of 1:45⅘ for two miles, doing it in 1:48.

Chandler, in a Mason, won the 10-mile event in slow time, while a Class C event for non-stock cars went to Rickenbacher.

Simplex Capital Now $1,500,000

One of the Members of New Directorate Also Member of B. F. Goodrich Co. —To Increase Production

NEW YORK CITY, Sept. 24—At the annual meeting of the stockholders of the Simplex Automobile Co. it was voted to increase the capital stock of the company from $1,000,000 to $1,500,000, in order to take care of the increased business made possible by the new factory at New Brunswick. The board of directors was also increased to eleven. The new officers will be as follows: President, Henry Lockhart, Jr.; first vice-president, Otto Boessneck; second vice-president, J. Hopkins Smith, Jr.; secretary and treasurer, C. T. Newbourg. The directors will be the above officers and Hobart J. Park, C. C. Goodrich, Hugo Boessneck, Robert Behr, G. J. Lansing, John D. Dale and G. E. Franquist.

The president, Mr. Lockhart, and the second vice-president, Mr. Smith, and Mr. Goodrich are members of the firm of Goodrich, Lockhart & Smith, bankers, of 60 Broadway. Mr. Goodrich is also a director of the B. F. Goodrich company, which was founded by his father. Mr. Park was formerly president of Park & Tilford; Messrs. Boessneck are members of the firm of Broesel & Co.; Mr. Behr, of Robert Behr & Co.; Mr. Lansing is a director of the National Commercial Bank, of Albany and president of the Albany Garage Co. Mr. Dale is well known in the automobile trade, having been connected with the Simplex company for a number of years as sales manager. Mr. Franquist is a superintendent of the Simplex company and the designer of the Simplex car. Mr. Herman A. Broesel, who has been with the company since its organization, has been appointed manager of the service department and Mr. Carl A. Broesel will be located at New Brunswick. On account of the increased production made possible by larger factory facilities the company is now in a position to take care of business outside of the present organized agency. Fred Titus formerly of the Alco company has been appointed assistant manager of agencies to take up the road work.

Michigan Creditors Reject Gerber's Bid

DETROIT, MICH., Sept. 24—*Special Telegram*—At the hearing in the bankruptcy proceedings of the Michigan Motor Car Co. before Judge Sessions in the United States district court at Grand Rapids today the bid of the Edward F. Gerber Co., of Pittsburgh, former distributer for Michigan cars, was unanimously rejected by the creditors. Gerber's bid, which he later withdrew, was $350,000 for the remaining assets of the company. The Detroit Trust Co. was appointed trustee. The hearing was adjourned until October 3 to await further bids. The Michigan concern has about $150,000 in cash and holds claims for about $450,000 against the Gerber Co.

Registration Figures Show Big Sales

KANSAS CITY, Mo., Sept. 15—The drought that has scorched this state this year, although the worst in the history of the state, since 1874, has far from crippled the car-buying possibilities as might have been expected. Figures compiled today by the secretary of state and the Kansas Tax Commission show that farmers and city men—principally farmers—have spent approximately $6,000,000 for the purchase of motor cars and motor cycles since March 1. The yearly tax assessments are made on that date and it was found that the state owned then 24,794 motor cars and 2,933 motorcycles. Today the state owns 31,742 motor cars and 5,727 motorcycles, according to licenses which have been issued. In other words, Kansas has 6,678 more motor cars and 2,794 motorcycles than it had 6 months ago.

And Kansas will not cease to purchase motor cars now. Its bank deposits are greater now than at any time in its history. Recent figures made public place it at $213,000,000. The state tax assessment this year exceeds that of last year $45,000,000 a total for this year of $2,810,861,092. And of these almost $3,000,000,000 the farmer is credited with more than half.

The wheat crop of Kansas this year is 86,515,000 bushels that is exactly 49 per cent. more than was raised in any other state in the Union.

LOS ANGELES, CAL., Sept. 19.—A valuable compilation of the total number of automobiles in use in the State of California has just been completed by the Automobile Club of Southern California. Through this canvass it is found that there were in California September 1 of this year 87,971 cars. Of this large number 51,936 were in Southern California. Comparing these figures with the population of Southern California it is shown there is one car to every 19.5 persons. By this time there are over 88,000 cars in the state.

ST. LOUIS, MO., Sept. 20.—Ford cars lead the field in automobile licenses during the month of August according to the figures from Secretary of State Roach. The registration for St. Louis fell off slightly during the past month, but 233 cars being booked. Almost half of these were Fords, the little machines, totaling an even 100 while the Hupmobile with thirteen was next. The Studebaker and Cadillac each had nine.

DENVER, COL., Sept. 19.—Colorado's first law for a state license tax on motor vehicles went into force July 14 this year and to date $50,000 has been collected from car and motorcycle registrations. To date nearly 10,000 automobiles have been registered of which number 4,500 are from this city. The registration fees for cars range from $2.50 to $10.00.

Meneghetti, Racing Driver, Killed

NORFOLK, NEB., Sept. 17.—Louis Meneghetti, the Italian automobile driver, raced to his death in Norfolk this afternoon. He was killed when his Fiat Tornado car turned turtle on a curve in the track.

Meneghetti was driving in a pursuit race with Gaston Morris, a Frenchman, in a National. At the initial curve in the track he drove around the angle at top speed and apparently glanced across the field to see how far away Morris was running. The outside rear axle twisted, the car turned over toward the inside of the track and Meneghetti was hurled out from underneath it.

Sixty-two Cars in Lu Lu Temple Run

PHILADELPHIA, PA., Sept. 20.—Despite unfavorable weather conditions sixty-two cars participated in the Lu Lu Temple Automobile Club's third annual sociability run to Atlantic City, N. J., today. J. W. Maurer, driving a Cadillac car, won the silver bowl emblematic of the first honors by finishing the 69 miles in 3 hours 43 minutes 22 seconds, 16 seconds shy of the official secret schedule, which was 3 hours 44 minutes 38 seconds. Joseph Way, president of the Lu Lu Automobile Club, driving a Packard, was second in 3 hours 43 minutes 44 seconds. Third prize went to C. L. Firth, Oakland car, in 3 hours 42 minutes 11 seconds, and fourth prize to F. E. Stockwell, Ford, 3 hours, 41 minutes 52 seconds. By a peculiar coincidence all four prize winners finished below the secret time allotted.

Falcon Cars Were Shown

In THE AUTOMOBILE for September 18 on page 536 two cyclecars were illustrated under the name of Economycar. These should have been labeled Falcon car. The views consisted of an elevation and plan.

Packard correction—In the description of the Packard "38" issue of September 11 THE AUTOMOBILE neglected to mention that this chassis is being designated 2-38 by the Packard company, and that it is scheduled with a special touring body of six-passenger capacity which lists at $500 under the regular touring car price, in other words, at $3,350. The company has announced this chassis as a 1915 model rather than a 1914.

New Detroit Automobile Models Shown at Michigan State Fair

DETROIT, MICH., Sept. 20—The Michigan State Fair closed its doors for another year tonight and with it the automobile show came to an end. This show, which is held in a special automobile show building, is always a sort of advance showing to the people of Michigan of some of the new models which will later be shown at the big automobile exhibitions at New York and Chicago.

As it is a dealers' proposition, not only the cars made in Michigan but many of those produced outside of the state are exhibited. Twenty-six makes of pleasure cars were represented, in addition to four makes of commercial vehicles. Half a dozen accessory concerns also exhibited. Among the newer cars to be shown were the 1914 Jackson models, the new Imperials, the Regals and the little six Oakland. The latter car is of the advanced streamline type and 48 horsepower. While many of the other cars shown were very new and of the 1914 vintage, they had been announced previous to this show.

The electric cars shown also revealed a new feature in the duplex drive, which consists of two sets of driving levers so that the machines may be controlled either from the front or the rear seat.

CONTINENTAL ENGINEERING CO.'S PLANT—The Continetal Engineering Co., Minneapolis, Minn., has located its factories and offices together and will begin full operation on October 1. This company manufactures large roadsters and cyclecars, besides regular engine work.

Canadian Top Co.'s Plant—The Canadian Auto Top Co., Tilbury, Ont., is considering the erection of a factory at Tilbury to cost about $20,000.

Beaver State Motor's Plant—The Beaver State Motor Co., Gresham, Wash., has purchased 5 acres near Gresham and will erect an automobile manufacturing plant.

National Motor Adding—The National Motor Co., Springfield, O., is erecting a one-story brick addition to its plant to be 36 by 60 feet in size, which will be used for assembling purposes.

G. J. G. Contemplates Moving—The G. J. G. Car Co., White Plains, N. Y., is contemplating moving to a more desirable automobile factory location and to that end is considering propositions and proposals.

Will Manufacture Automobile Forgings—The Swedish Crucible Co. has begun the erection of a small factory for the manufacture of automobile forgings at the corner of McDougall avenue and Hanna street, Windsor, Ont.

Ford Buys Toronto Site—The Ford Motor Co. of Canada has bought a site in Toronto, Ont., and will commence immediately the erection of a six-story building. The property is located at the corner of Dupont and Christie streets.

Temporary Quarters Opened—Temporary quarters have been opened in the Walkerville Light & Power Co.'s plant at Walkerville, Ont., by the Diamond Mfg. Co., of Detroit, for the manufacture of automobile stampings and windshields.

Victor Tyre Co. in Canada—The Victor Tyre has invaded the Canadian market in Montreal. In case the sales warrant the expenditures it has been hinted that a Canadian factory for the manufacture of these tires in Canada will be erected.

Goodrich Plant in Toronto—It is stated that the B. F. Goodrich Tire & Rubber Co., Akron, O., has completed arrangements for the openig of a Canadian branch factory at Toronto, Ont. The new plant, it is stated, will employ 1,800 hands at the start.

Packard Technical Experts in Conference—More than sixty technical experts in charge of service stations maintained by Packard dealers throughout the country have been in conference this week at the factory of the Packard Motor Car Co., Detroit, Mich.

Presto-O-Lite Astoria Plant Wrecked—The eastern plant of the Prest-O-Lite Co., at Astoria, L. I., was destroyed by fire last week, and more than 30 employees were injured. An explosion in the charging room shattered the windows and doors, giving free exit to the flames.

Augusta to Have Plant—Augusta, Ga., is to have an automobile tire factory in the near future. W. A. Smith is president, H. S. Dunbar, vice-president and J. P. Armstrong, secretary and treasurer. The Southern Tire & Rubber Co. will be the name of the new industry.

Hendrixson Trucks Plant—M. Hendrixson, formerly employed at the plant of the Lauth-Juergens Motor Car Co., Fremont, O., has organized what is known as the Hendrixson Truck Co., which will make several kinds of motor trucks. It is planned to locate the plant in Chicago, Ill.

John Brown Plant Progressing—Rapid progress is being made in the erection of the large new plant for the John W. Brown Mfg. Co., located on Marion Road, Columbus, O. It is expected to have the plant ready for occupancy by the first of the year if not sooner. The concern is one of the largest makers of automobile lamps in the country and its entire output is constructed by the Ford Co.

New Ford Philadelphia Plant—The contract for the erection of a huge assembling plant for the Ford Motor Co., at the northwest corner of Broad street and Lehigh avenue has been awarded. Of reinforced concrete construction, the new Ford building will be ten stories in height, extending 325 feet along Broad street with a depth of 125 feet. When finished the plant will represent an expenditure of $800,000.

Ætna Rubber Co. Buys Land—The Ætna Rubber Co. will soon occupy a new factory building on Perkins avenue near East 31st street, Cleveland, O. The lot on which the factory stands is 70 by 132 feet in size and the building is 50 by 120 feet. The structure stands on a foundation capable of supporting four stories. The consideration is said to have been close to $13,000.

N. Y. and Detroit Factories Consolidate—The Emil Grossman Mfg. Co., Inc., has consolidated its Detroit, Mich., plant with the New York City one, with a factory in the Bush Terminals, Model Factory No. 20, 41st street and 2d avenue, Brooklyn. The new quarters embrace an area of 31,000 square feet, on one floor, two and one-half times the manufacturing and office room formerly occupied. The present building in Detroit will be continued as the Western branch. The porcelain factory in Trenton, N. J., will not be disturbed, as several new kilns were recently built and three additional buildings are being completed.

The Automobile Calendar

Shows, Conventions, Etc.

October 13	Philadelphia, Pa., National Fire Prevention Conference Philadelphia Fire Prevention Commission.
Oct. 25	New York City, Electrical Exposition Motor Show, Grand Central Palace.
Oct. 27-28	Chicago, Ill., Fourth Annual Convention, Electric Vehicle Assn. of America.
Nov. 8-15	Atlanta, Ga., Show, Atlanta Automobile & Accessory Assn.
Dec. 9-12	Philadelphia, Pa., Annual Convention of American Road Builders' Association.
Dec. 11-20	New York City, First International Exposition of Safety and Sanitation, under the auspices of the American Museum of Safety.
Jan. 2-10, 1914	New York City, Importers' Automobile Show, Hotel Astor.
Jan. 3-10, 1914	New York City, Automobile Show, Grand Central Palace.
Jan. 24-31, 1914	Chicago, Ill., Automobile Show, Coliseum and First Regiment Armory.
Jan. 26-31, 1914	Scranton, Pa., Automobile Show, Automobile Assn. of Scranton.
Jan. 31-Feb. 7, 1914	Minneapolis, Minn., Automobile Show.
Feb. 2-7	Buffalo, N. Y., Automobile Show, Buffalo Automobile Dealers' Assn.
Feb. 9-14	Buffalo, N. Y., Truck Show, Buffalo Automobile Dealers' Assn.
Feb. 21-28	Newark, N. J., Automobile Show, N. J., Auto Trade Assn.
Feb. 22-27	Omaha, ..eb., Automobile Show, Omaha Automobile Assn.
Feb. 22-March 5	Cincinnati, O., Automobile Show, Cincinnati Automobile Dealers' Assn.
Mar. 9-14	Des Moines, Ia., Show, Des Moines Automobile Dealers' Assn.

Race Meets, Runs, Hill Climbs, Etc.

Sept. 26	San Marco, Tex., Hays Co. Fair Assn.
Sept. 27	White Plains, N. Y., Track Meet, G. T. Long.
Sept. 27-28	Bakersfield, Cal., Track Races, Kern Co. Fair Assn.
Sept. 28	Terra Haute, Ind., Track Race, E. A. Moross.
Oct. 3	Trenton, N. J., Track Meet, Inter-State Fair Assn.
Oct. 3-4	Oklahoma City, Okla. Race Meet, Oklahoma State Fair Assn
Oct. 4	Fresno, Cal., Track Meet, Fresno Co. Agricultural Society.
Oct. 4	St. Louis, Mo., Tour, Auto Club of St. Louis.
Nov. 2-3	Los Angeles, Cal., Road Race, Los Angeles to Phoenix, Ariz.
Nov. 3	Los Angeles, Cal., Road Race to Phoenix, Ariz.
Nov. 6	Phoenix, Ariz., Track Meeting, State Fair.
Nov. 24	Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.
Nov. 27	Savannah, Ga., Grand Prize Road Race, Automobile Club of America.

Foreign

Sept. 25	Isle of Man, International Stock Car Race.
Oct. 17-28	Paris, France, Automobile Show, Grand Palais, 10 days.
Nov. 7-15	London, Eng., Annual Automobile Exhibition, Olympia.

The Week in the Industry

Motor Men in New Roles

SMITH LOZIER DISTRICT MANAGER—Frank H. Smith, who joined the sales force of the Lozier Motor Co. at Detroit, Mich., several months ago, has been made central district manager for the Lozier company, with offices in Chicago, Ill. Mr. Smith will make his headquarters with the Bird-Sykes Co., Chicago agent for the Lozier car. As district manager he will have general supervision over the following territory: North and South Dakota, Nebraska, Kansas, Missouri, Iowa, Illinois, Indiana, Minnesota, Wisconsin and the Upper Peninsula of Michigan.

NEW MERCER SALES MANAGER—W. A. Almy has been appointed sales manager of the Mercer Automobile Co., Trenton, N. J.

PRESCOTT MANAGER CARTERCAR BRANCH—J. W. Prescott has been appointed manager of the Cartercar factory branch in Seattle, Wash.

CURTIS WITH NEW YORK CO.—H. T. Curtis has been appointed manager of the New England branch of the Invader Oil Co., in Boston, Mass.

GREENE SALES MANAGER—C. Floyd Greene, of Detroit, Mich., has been appointed sales manager of the Washington Automobile Co., Washington, Pa.

PLOWMAN INVADER'S PHILADELPHIA MANAGER—H. M. Plowman has been appointed manager of the Philadelphia, Pa., office of the Invader Oil Co., New York City.

KNOWLES ANDERSON ELECTRIC ENGINEER—R. W. Knowles has been appointed engineer of the truck department of the Anderson Electric Car Co., Detroit, Mich.

COLEMAN DAYTON MANAGER—John Coleman, who has been connected with the Columbus offices of the Standard Oil Co., has been promoted to manager of the Dayton, O., office.

CHIDESTER PITTSBURGH MANAGER—R. H. Chidester, formerly of Pittsburgh, has been made manager of the Motor Owners' Supply Co., of 85 North Third street, Columbus, O.

MAIS RESIGNS—J. A. Mais has resigned as general manager of the Rochester Mais Commercial Car Co., of Rochester, Ind., and has severed his connections with the company.

WILLIAMS ADVERTISING CHIEF—D. B. Williams has been appointed general advertising manager for both the American and Marion accounts of the J. I. Handley Co., Indianapolis, Ind.

DURPHY BROCKWAY SALES MANAGER—W. H. Durphy, formerly sales manager of the Chase Motor Truck Co., Syracuse, N. Y., has become sales manager for the Brockway Motor Truck Co., Cortland, N. Y.

KING GOODYEAR ADVERTISING MANAGER—L. L. King has been appointed advertising manager of the Goodyear Tire & Rubber Co., Akron, O., succeeding H. S. Quine, who is now assistant to president F. A. Seiberling.

CALAHAN MANAGER—W. W. Calahan, of Chicago, Ill., has been appointed manager of the Milwaukee-Wisconsin branch of the Goodyear Rubber & Tire Co., 134-136 Oneida street, succeeding Herbert P. Ziegler, who goes to the Chicago branch.

BAUS REJOINS STUDEBAKER—Richard E. Baus, a former Studebaker manufacturing expert, who has been more recently in charge of the Maxwell plant at Dayton, O., has rejoined the Studebaker Corp. staff as an assistant to Max Wollering, production manager.

HORTON AND JONES JOIN HANDLEY—E. H. Horton and Tom O. Jones, formerly of the R-C-H Corp., Detroit, Mich., have joined the J. I. Handley Co., Indianapolis, Ind., the former as sales manager for the Marion division and the latter as general publicity manager.

BEESON STUDEBAKER'S ATLANTA MANAGER—W. W. Beeson, formerly manager of the Louisville, Ky., branch of the Studebaker Corp., Detroit, Mich., has been appointed manager of the Studebaker branch in Atlanta, Ga., to which are tributary the states of Georgia, Alabama, Florida, South Carolina and part of North Carolina.

HUTCHINSON PACKARD TRAFFIC ENGINEER—Rollin W. Hutchinson, Jr., has been appointed traffic engineer of the truck division of the Packard Motor Car Co., Detroit, Mich. He was formerly connected with the Westinghouse interests as technical writer and subsequently was engaged in mechanical and electrical engineering practice.

SWEET RESIGNS FROM DISCO—Geo. P. Sweet, secretary and general manager of the Disco Co., Detroit, Mich., maker of electric and acetylene lighting and cranking systems for automobiles, has resigned from the concern and disposed of his stock holdings. Mr. Sweet expects to re-enter the automobile industry in Detroit after about a 30-day vacation.

LOGIE CANADIAN SALES MANAGER—As a preliminary step toward the marketing of a greater portion of its output in the Dominion of Canada, the Lozier Motor Co., Detroit, Mich., has announced the appointment of Louis Logie, of Toronto, Ont., to the position of Canadian sales manager. Mr. Logie has already established his headquarters in Toronto and will have supervision of Lozier sales throughout the various provinces.

The Garage and Dealers' Field

CADILLAC'S NEW CLEVELAND HOME—Bids have been given out for the erection of a four-story building for the Cleveland Cadillac Co., at Euclid avenue and East Twentieth street, Cleveland, O. The structure will have a frontage of 120 feet on Euclid avenue. The depth of the main building will be 100 feet. Back of this will be a garage and repair shop one story high with a frontage on East Twentieth street of 75 feet and a depth of 102 feet. The foundations are being built to carry four stories more than will be erected at first. The main offices and the salesroom will be on the first floor, which will contain also a ladies' rest room. A mezzanine floor will extend across the rear of the first floor, to be used by the bookkeepers. The second floor will be devoted to painting, top repair and manufacture and storage battery business. The third floor will contain stock rooms and repair department, and the fourth floor will be devoted to general repair work. Its cost will be about $125,000. The building will give the company about 60,000 square feet of floor space. It is expected to have it completed about January 1.

CANADIAN FORD AGENT MOVES—The Ford Motor Co. of Canada, Lt., Montreal, Que., has removed to more commodious quarters on St. Catherine street, west.

AJAX-GRIEB'S INDIANAPOLIS BRANCH—Within a short time a factory sales branch of the Ajax-Grieb Rubber Co., Trenton, N. J., will be opened in Indianapolis, Ind.

WESTFIELD FORD AGENT BUILDS—Ground has been broken for a $9,000 garage and repair shop building for the Quinn & Clark Motor Co., Westfield, Wis., agent for the Ford.

DETROIT DEMOUNTABLE RIM AGENT—A. J. Monday, 321 Fourth street, Milwaukee, Wis., body builder, trimmer, etc., has been appointed state agent in Wisconsin for the Detroit demountable rim.

BUICK DEALERS ATTEND SCHOOL—About 100 Indiana Buick dealers and their mechanics attended a school of instruction in Indianapolis, Ind., recently. The school was conducted in the factory sales branch of the Buick Motor Co.

JOINS DEALERS' BODY—At a recent meeting of the Board of Directors of the Automobile Dealers' Assn., Inc., New York City, the Stutz Motor Car Co. was unanimously elected a member of the association, to be represented by William Parkinson.

MERRILL WANTS APPARATUS—The Common Council of Merrill, Wis., has appropriated funds for the purchase of one piece of motor-propelled fire-fighting apparatus, which will be selected by the Board of Public Works and Chief of the Fire Department at once.

FORD'S BUENOS AIRES SERVICE BRANCH—The Ford Motor Co., Detroit, Mich., will establish a selling and service branch in Buenos Aires, the first branch in South America. It will be in charge of E. H. Hampton, who has been the Ford export manager, with offices at 18 Broadway, New York City.

SIX-CYLINDER FUNERAL CARS—What is said to be the first fleet of six-cylinder automobiles used for funeral purposes in the United States was recently put in motion by the Ascker-Helderle Undertaking and Livery Co., of St. Louis, Mo. The fleet, which is composed of eleven cars, includes nine Premiers and two Dorris cars. This firm has entirely discarded horse-drawn vehicles.

NEW SERVICE RECORDER AGENT—W. A. McDermid, sales manager of the Service Recorder Co., Cleveland, O., announces the appointment of the Atlas Commercial Co., of Ponce and San Juan, Porto Rico, as representatives for the sale of the Service Recorder. The Service Recorder Company is now represented by factory branches in Boston, New York, Philadelphia, Baltimore, Washington, Atlanta, Buffalo, Pittsburgh, Cleveland, Cincinnati, Indianapolis, Detroit, Chicago, St. Louis, Kansas City and Minneapolis, and on the Pacific Coast by the Geo. F. Eberhard Co., with offices in San Francisco, Los Angeles, Seattle and Portland.

JOHNS-MANVILLE OPENS GALVESTON BRANCH—The H. W. Johns-Manville Co. now boasts three offices in the Lone Star State, viz., at Houston, Dallas and Galveston. At the last named place, in a modern brick warehouse of large proportions, will be consolidated the stock for distribution to the different offices and throughout the firm's Texas territory. Galveston, because of its location and shipping facilities, makes an ideal concentration center. The steadily increasing trade with Central and South America also makes Galveston a convenient point of distribution. The H. W. Johns-Manville Co. is among the country's largest houses dealing in roofing, building materials, packings, pipe coverings, insulating materials and electrical goods, and is the world's largest manufacturer and distributor of asbestos goods. This concern owns extensive asbestos mines in Danville, P. Q., Canada, and has nine factories located in various cities throughout the United States.

AUTOMOBILE FEDERATION FORMED—At a meeting of representatives of the Canadian automobile clubs and associations held recently at the headquarters of the Ontario Motor League, Toronto, Ont., a Dominion Automobile Federation was formed. All clubs, leagues and associations in the Dominion are to be eligible for membership.

BRICK ADDITIONS STARTED—The Capitol City Auto Co., Minneapolis, Minn., now has under way a brick addition 22 by 65 feet. When completed this will be used by the coppersmiths and the radiator department. The offices will be removed from the second floor to the first in the main building. The tire department will be housed in the new addition. The concern, which has lately increased its livery fleet, has planned to put a wrecking car in service. A new driveway which will eliminate an elevator is being constructed. Another entrance will be provided on Allyn street.

HARTFORD ADDS TRUCK—The Hartford, Conn., Water Department is one of the latest branches of the city government to come to motor trucks. The last car put in commission is a 1½-ton Pope-Hartford. This is used for hauling the smaller sizes of water pipe, tools, corded wood for the metal pot fires and the like. The car is used throughout the town and operates between the main supply yard in the heart of the city and the outside station near Charter Oak Park. The brick garage is being built to house the cars. Agitation favors the employment of a competent mechanic to care for the cars, as is now being done in the police department.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

CAMDEN, N. J.—Automobile Development Co.; capital $10,000; to manufacture, buy, sell and deal in and with automobiles, and all parts thereof. Incorporators: Geo. H. B. Martin, S. C. Seymour, Jos. F. Cotter.

CHICAGO, ILL.—Automobile Realization Co.; capital, $00,000; to deal in automobiles. Incorporators: A. B. Johnston, G. B. Smith, G. F. Matthis.

CHICAGO, ILL.—Ross-Sleeve Motor Co.; capital, $20,000. Incorporators: F. W. Bull, E. Lundblad, A. S. Lytton.

CHICAGO, ILL.—Sixty-first Street Garage Co.; capital, $1,500; to deal in automobiles. Incorporators: A. C. Bender, W. A. Belle, C. L. Sentz.

CHICAGO, ILL.—Times Square Co. of N. Y.; capital, $150,000; to deal in automobiles.

CHICAGO, ILL.—Trumbly Co.; capital, $10,000; to deal in automobiles, general repairs. Incorporators: M. J. Woodhull, J. G. Trumbly, R. B. Lacey.

DETROIT, MICH.—Metal Parts Engineering Co.; capital, $25,000; to manufacture automobile parts. Incorporators: W. L. Kenfield, W. W. McIntyre.

EAU CLAIRE, WIS.—Darwin Motor Car Co.; capital, $10,000; to deal in automobiles. Incorporators: W. C. Tufts, Gunder Anderson, M. D. Garrison.

NEW YORK CITY—Harroun Carbureter Co.; capital, $25,000; to manufacture automobile parts. Incorporators: Victor Kliesrath, Walter F. Blaisdell, R. Burchard Hults.

NEW YORK CITY—Lent Motor Fire Engine Corp.; capital, $250,000; to sell self-propelled fire engines. Incorporators: W. R. Fuller, Oscar J. Heig, I. Vernon Weisbrod.

OKLAHOMA CITY, OKLA.—Hupmobile Sales Co.; capital, $5,000. Incorporators: W. H. Say, L. S. Liggett, Harry Poole.

PHILADELPHIA, PA.—Colonial Motor Car Co.; capital, $20,000.

PONTIAC, MICH.—Pontiac Motor Car Co.; capital, $35,000. Incorporators: I. A. Morrison, C. F. Taylor, E. Hoobler.

ST. LOUIS, MO.—Southern Motor Car Co.; to distribute Haynes and Metz cars. Incorporators: C. B. Quarrels, John D. Kerr, J. David Barth.

TEXARKANA, TEX.—Motor Mart; capital, $5,000; to deal in automobiles. Incorporators: J. E. McCulloch, R. P. Wilson, J. C. Watts.

TUCSON, ARIZ.—Richardson Auto Co.; capital, $20,000. Incorporators: J. Breck Richardson, Henri Gauthen, C. W. McCullough, C. T. McCullough.

VICTORIAVILLE, QUE.—Arthabaska Motor Car Co., Ltd.; capital, $19,000; to deal in automobiles. Incorporators: Fred Bastien, J. O. Bastien, Auguste Quesnel, Jr., William Bergeron, L. P. Crepear.

WILMINGTON, DEL.—Michigan Motor Car Co.; capital, $1,000. Incorporators: H. E. Latter, W. J. Maloney, O. J. Reichard.

GARAGES AND ACCESSORIES

AUBURN, N. Y.—Ten Eyck Pump Co.; capital, $5,000; to manufacture air pumps, compressed air starters for automobiles and other accessories. Incorporators: F. E. Ten Eyck, J. C. Glaum, M. H. Ten Eyck.

BELOIT, WIS.—Heon Electric Reminder Co.; capital, $10,000; to manufacture an electrical clock device for hotels, garages, factories, etc. Incorporator: Charles Heon.

CHICAGO, ILL.—Johnson Electric Appliance Co.; capital, $25,000; to manufacture electric appliances. Incorporators: H. B. Johnson, T. B. Dockson, J. F. Williams.

CHICAGO, ILL.—Simplex Wire Wheel Co.; capital, $300,000; to manufacture wire wheels. Incorporators: J. J. Cusick, A. G. Loveless, J. R. Cockran.

CINCINNATI, O.—Jenkins Graphite & Lubricating Co.; capital, $100,000; to manufacture and deal in lubricants of all kinds. Incorporators: S. M. Jenkins, E. G. Reitman, Walter Reinhart, Laurette Nolan, William J. McCauley.

CLEVELAND, O.—Arter Auto Body Co.; capital, $20,000; to deal in automobile bodies and automobiles. Incorporators: Edward Younger, F. S. Rice, J. S. Castle, W. E. Freese, W. T. Redmond.

CONNERSVILLE, IND.—American Motor Wheel Co.; capital, $600,000; to manufacture a pneumatic wheel. Incorporators: W. H. Orren, S. C. Rowland, J. V. Wilson.

EDWARDSVILLE, ILL.—Edwardsville Garage and Auto Supply Co.; capital, $10,000; general garage business. Incorporators: T. J. Fahenstock, O. H. Giese, W. P. Kriege.

HEMPSTEAD, N. Y.—G. B. Garage & Mfg. Co.; capital, $50,000. Incorporators: Samuel C. Sammis, Lewis B. Haff, Rignal L. Vandewater.

HEMPSTEAD, N. Y.—London Limousine Co.; capital, $10,000; detachable auto bodies. Incorporators: John McAvoy, Charles U. Stowe, Anna M. Stowe.

HERKIMER, N. Y.—The Garage Co. of Herkimer, N. Y.; capital, $5,000. Incorporators: Charles O. Terwilliger, Josephine B. Terwilliger, Newton Fosa Hand.

NEW YORK CITY—Automobile Manual Publishing Corp.; capital, $1,000. Incorporators: David M. Steindler, Herbert Goldsmith, George Holland.

NEW YORK CITY—Sharrer Patent Top Co.; capital, $25,000; to manufacture tops for automobiles, motor boats, etc. Incorporators: Elias B. Hart, Jacob M. Sharrer, Paul McCoy.

OKLAHOMA CITY, OKLA.—Rex Oil Refining Co.; capital, $50,000. Incorporators: L. M. Pierucis, M. Lutz, M. Boyce.

CHANGE OF NAME AND CAPITAL

BROOKLYN, N. Y.—Lincoln Electric Co.; change of name to the HI-PO Waterproof Battery Co.

New Agencies Established During the Week

PASSENGER VEHICLES

Place	Car	Agent
Baltimore, Md.	Cole	Poehlman Automobile Co.
Bloomington, Ind.	Cole	College Avenue Garage Co.
Boston, Mass.	Cole	Cole Motor Car Co. of Boston
Bowen, Ill.	Cole	H. L. Spangler
Carroll, Ia.	Cole	J. E. Osborne
Chicago Heights, Ill.	Cole	Conklin & Spindler
Cincinnati, O.	Cole	Geo. C. Miller & Sons Carriage Co.
Columbia, Mo.	Cole	Columbia Auntomobile Co.
Columbus, O.	Cadillac	Curtin Williams Auto Co.
Columbus, O.	Chandler	Gaither Auto Co.
Columbus, O.	Cole	Franklin Cycle & Supply Co.
Columbus, O.	Imperial	Warren & Southwick Car Co.
Corydon, Ind.	Cole	G. A. Bulliet
Decatur, Ill.	Cole	Fireproof Garage
Denison, Tex.	Cole	Davis Livery & Auto Co.
Des Moines, Ia.	Moon	Inter-State Auto Co.
Duquoin, Ill.	Moon	Southern, Ill., Garage
Easton, Pa.	Cole	Lafayette Motor Car Co.
Eau Claire, Wis.	Cadillac	Darwin Motor Car Co.
Elk Creek, Neb.	Ford	George Van Winkle
Freehold, N. J.	Cole	Clayton & Donahay
Grand Rapids, Mich.	Cole	E. A. Merrill
Green Bay, Wis.	Cole	Washington Garage
Hoopestown, Ill.	Moon	John Ruck
Huron, S. D.	Cole	A. M. Urquhart
Jefferson City, Mo.	Cole	Capitol Equipment Co.
Joplin, Mo.	Cole	P. E. Tabor
Kansas City, Mo.	Cole	Cole Motor Car Co. of Mo.
Lawton, Okla.	Pierce-Arrow	Fred Hannan
Lexington, Mo.	Cole	John M. Seiter
Logansport, Ind.	Cole	Auto Distributors Co.
Los Angeles, Cal.	Stearns	F. B. Stearns Co. of Cal.
Madison, S. D.	Cole	Abel Mitchell
Madison, Wis.	Reo	Curtis Automobile Co.
Mansfield, O.	Cole	H. C. Burns
Marion, O.	Cole	C. E. Miller
Marshall, Mo.	Cole	Blosser Bros.
Meridian, Miss.	Cole	Chas. K. Cohn & Co.
Mexico, Me.	Cole	Fred A. Morris
Milton, Pa.	Cole	Coover's Garage
Milwaukee, Wis.	Hupmobile	E. F. Sanger Co.
Moorestown, N. J.	Cole	Moorestown Motor Co.
Nashville, Tenn.	Cole	Cumberland Motor Co.
Newton, Ill.	Cole	Newton Motor Car Co.
Oran, Mo.	Cole	C. & A. J. Matthews
Ord, Neb.	Ford	T. P. Newbecker
Ortonville, Minn.	Cole	J. Arthur Matthews
Oxnard, Cal.	Cole	Crescent Garage & Machine Co.
Parsons, Kan.	Cole	O. H. Peak
Pasadena, Cal.	Cole	C. M. Davis
Perry, N. Y.	Cole	J. Yauchsey
Philadelphia, Pa.	Stearns	F. B. Stearns Co. of Philadelphia
Pilot Grove, Mo.	Cole	H. C. Simmons
Plattsmouth, Neb.	Ford	Plattsmouth Garage
Porterville, Cal.	Cole	G. J. Stillman
Portland, Ore.	Cole	Northwest Auto Co.
Raleigh, N. C.	Cole	J. R. Norris
Salisbury, Mo.	Cole	Stamper & Stamper
San José, Cal.	Cole	Dixon & Baumgartner
Santa Barbara, Cal.	Cole	H. Wood & Son
Santa Rosa, Cal.	Cole	Theodore Baisden
Sault Ste. Marie, Can.	Cole	Fulton Hardware Co.
Sioux Center, Ia.	Cole	John Winterfield
Sioux Rapids, Ia.	Cole	Sioux Rapids Auto Co.
Sisseton, S. D.	Cole	Stavig Bros.
Somerville, Tenn.	Cole	C. A. Oliver
Springfield, O.	Cole	E. L. Ensign
St. Louis, Mo.	Briggs-Detroiter	Weber Implement Co.
St. Louis, Mo.	Haynes	Southern Motor Car Co.
St. Louis, Mo.	Kissel Kar	Kissel Kar Co.
St. Louis, Mo.	Metz	Southern Motor Car Co.
Streator, Ill.	Cole	Central Garage
Tacoma, Wash.	Chandler	Chase Garfield
Tekamah, Neb.	Cole	Smith & Belleville
Titusville, Pa.	Cole	Keystone Automobile Garage Co.
Tucson, Ariz.	Maxwell	Huck-Clarke Co.
Wabash, Ind.	Cole	Silas Swank
Washington, D. C.	Reo	Zell Motor Car Co.
Watertown, Wis.	Ford	Klinger & Radloff
Weeping Water, Neb.	Ford	J. E. Jenkins
Winkelman, Ariz.	Studebaker	L. E. Hoeye
Winterset, Ia.	Cole	Elmer Orris & Co.
Worcester, Mass.	Cole	Thorvald Hanson
Youngstown, O.	Cole	Dietrich Motor Car Co.

COMMERCIAL VEHICLES

Place	Car	Agent
Columbus, O.	Service	Service Garage and Sales Co.
Los Angeles, Cal.	Perfex	M. S. Bulkley & Co.
Phoenix, Ariz.	Federal	M. Rudolph

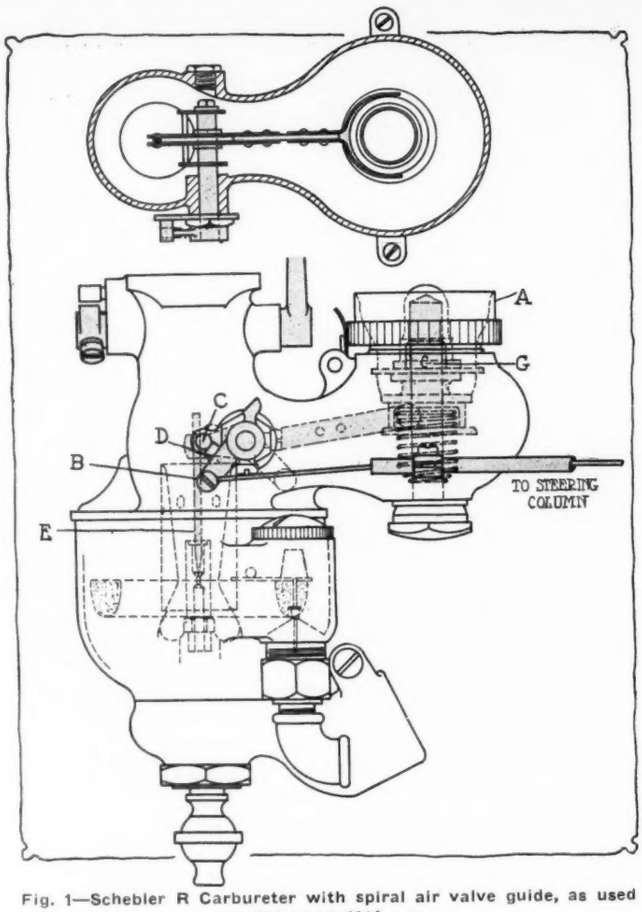

Fig. 1—Schebler R Carbureter with spiral air valve guide, as used in Overland 1914 cars

Schebler R Is Automatic

Needle Valve Interconnected with Air Valve Features New Instrument

SCHEBLER has brought out a new single jet carbureter under the name of Model R. It is a concentric venturi type with a spring auxiliary air valve that has several new features as compared to previous Schebler designs. In its final and perfected stage the new R carbureter takes the form shown in Fig. 2, page 586. As will be seen from the dotted lines, the single jet J, is in the center of the carbureter and the float chamber F is annular about it.

Gasoline enters at O through the customary needle valve arrangement into the float chamber F, rising to a level of about 1-16 inch below the top of the jet opening J. Entrance of gasoline from the float chamber to the central jet passage is through a series of holes arranged in a ring around the bottom of the chamber.

The primary air passage is through the center of the carbureter by way of the venturi V around the jet and thence to the intake passage I. As shown in the illustration, the air intake pipe A, is arranged to take a flexible hot air tube by means of which air heated by the exhaust can be used, instead of taking the air directly from the atmosphere. This air intake, together with the gasoline jet in the venturi, comprises the entire carbureter as far as low speed purposes are concerned.

To secure the proper mixture at low speed the customary needle valve or metering pin N, projecting downwards into the jet, is used. The arrangements by which this jet needle valve is controlled, however, are distinctive. The adjustment for this jet is made by means of a Bowden wire W from the steering column. This wire is connected with a bell crank lever C on the side of the carbureter, which raises and lowers the needle valve when it is turned.

The Bowden wire is so arranged that when the lever on the steering column controlling it is in its central position on the steering column the carbureter is in its correct position for low speed. The running position of the carbureter is when the boss on the lever is against the stop. The lever on the steering column should then register at the words Lean, or Air.

Thus far the carbureter consists of an ordinary needle valve and venturi with full control over the position of the needle valve from the driver's seat. Thus, if climatic conditions change and the mixture needs to be richer or leaner to meet existing conditions, the adjustment can be made from the seat by giving a little more or less gas as required. This is the manual part of the carbureter. All the other features and the entire operation of the carbureter at higher speeds, are automatic.

There are two types of air valve fitted on the Model R. The regular stock R on the open market has a spring-controlled air valve with its movement regulated by a dash pot P. The dashpot is formed by a piston on the end of the air valve stem which raises and lowers it with the movements of the air valve. The other model R, Fig. 1 is that used on the Overland car. This has no dash pot. Chattering of the air valve is done away with by having it work up and down on a spiral guide G. Otherwise the principle is the same.

Air Valve Automatic

The air valve works absolutely automatically on both these models, the adjustments being slightly different. The principle of the valve is the same as that used on previous models and consists of furnishing the required additional air when the motor speed increases. This is done automatically by having the suction of the motor act on the air valve, pulling it from its seat against the tension of the spring. The adjustment consists in increasing or decreasing the tension on this spring.

When the air valve on this carbureter opens it lifts the needle valve with it, to a degree which has been worked out in the factory. In lifting the needle valve by an interconnected lever L the lever C controlled by the Bowden wire does not move. The connection between the Bowden wire device and the automatic lift is similar to the relation that exists between the hand throttle lever and the accelerator pedal, the latter merely furnishing the set or minimum position.

Adjusting Spiral Air Type

To adjust the carbureter make sure that the ignition is properly timed, and that you have a good hot spark at each plug; that your valves are properly timed and seated, and that all connections between your intake valves and carbureter are tight, and that there are no air leaks of any kind in these connections.

First attach lever B, Fig. 1, to steering column control or dash control, so that when boss D of lever B is against stop C, the lever on steering column control or dash will register Lean, or Air. This is the proper running position for lever B. Turn the air valve cap A to right until it stops, then turn it to the left about two complete turns.

To start the engine, open the throttle from one-eighth to one-quarter. Then move the steering column control lever toward Gas, or Rich, which lifts needle E out of the nozzle and makes a rich mixture for starting. After the engine is warmed up to usual running temperature move the control lever back to Air, or Lean, and adjust the air valve cap A for slow engine speeds or idling. Turning air valve cap A to the right lifts needle E out of the nozzle and enriches mixture. Turning it to the left lowers the needle into nozzle and makes the mixture lean.

For best economy and power we recommend that slow speed adjustment be made as lean as possible.

After the correct mixture is obtained at slow engine speeds, the action of the carbureter is automatic at higher speeds, the suction of the engine governing the position of the air valve and the gasoline needle.

Best Total Gear Ratio for Trucks

(*Continued from page* 563.)

a motor regulated to 800 revolutions? What power will be required in each case?

The driving wheels of subsidized trucks have a diameter of about 1 meter and should make 2 turns per second at a speed of 25 kilometers; or 120 per minute. In order to arrive at this speed from the motorshaft speed of 1,100 revolutions, the reduction to be provided in the transmission elements is nearly from 10 to 1. With the high gear direct, this reduction is easily obtained in chain-drive trucks by means of the bevel-gear on the jackshaft and the chain sprockets. In shaft-drive vehicles a reduction is required between the bevel gear and the wheels. In other words, with both systems two reductions are needed.

With a motor regulated to 800 revolutions the reduction is only about 6 to 1, and this may at a pinch be materialized in a shaft-drive vehicle by using a bevel-gear crown with 74 teeth and a pinion with 12 teeth, but this proportion is not recommendable. By dispensing with direct drive the reduction can, however, be obtained properly through the rear-axle gear alone, and the remodeled gearbox in that case gives one train of gears less in engagement for low, second and third speeds.

So far as the power is concerned, if the mechanical efficiency is supposed to be 80 per cent. and the traction resistance proper is taken to be 25 to 30 kilograms per ton, a torque of 210 kilograms at the wheel rim to be produced at a speed of 7 meters per second corresponds to 20 horsepower at the rim and calls for a motor of 25 horsepower at the standard speed of the motor.

Drawbacks of Choking Big Motor

Examining the motors actually used, one finds that those which develop 24 horsepowers at 1,100 revolutions are of the type with four cylinders of 100 by 140 bore and stroke, and that those which develop 25 horsepowers at 800 revolutions differ by having a bore of 110 and, further, that the motors of the latter class have to be regulated specially to prevent them from working normally at their true speed of 1,100 revolutions at which they give 35 horsepowers.

By operating in this manner, one is then led to adopt a motor with surplus power which is rendered anemic on purpose to hinder it from running naturally, and in the end one has to provide the same number of gear-reducing elements for the high speed gear as are necessary with the smaller motor, as it becomes necessary to suppress the direct drive, with the additional result that it becomes bothersome to effect the best reductions for the three other gear speeds which now have to be realized by two trains of pinions instead of by three. The truck so equipped moreover has a reduced motor efficiency, totally lacks flexibility on the high gear and can only with difficulty be made sufficiently slow on the low gear.

The Author's Disappointing Conclusion

Evidently a builder turning out trucks of different tonnage capacity might contemplate to adapt the same motor to them all, with its power regulated to the demands in each case, but despite its attractive economical aspect this method would represent a grave fault in design. There is apparently no escape from the need of giving to each type of vehicle the motor which is most suitable for it.—From *Omnia*, Sept. 6.

New Hupmobile Has Electric System

(*Continued from page* 575.)

brake. There are eight springs to hold the plates together which are readily reached through the gearcase hand hole. Each is provided with a nut for adjusting the tension.

The selective gearset gives three forward speeds. The gears are of the stub-tooth type, very short and thick and made of an alloy steel. Hyatt roller bearings carry the layshaft and the mainshaft, an F. & S. annular bearing being also used at the forward end of the mainshaft.

The propeller shaft is inclosed within a torque tube of generous proportions which bolts to the malleable axle housing. The universal joint at the forward end is of the block-and-trunnion type. No radius rods are used. The floating rear axle has the drive shafts heat treated. They are nickel steel. The bevel gear and differential and also the pinion are mounted between Hyatt roller bearings.

The rear spring suspension is peculiar to Hupmobile cars of this model. There is a single cross-spring which hangs at its ends in ball shackles attached to the axle housing. This spring connects at its center to the rear cross-member of the frame by a spherical joint, thus providing the frame with three-point support. Back of the axle housing a shock-absorbing toggle joint fastens at one end to the frame and at the other to the lower part of the differential housings, thus damping the movement of the rear spring. The front springs have a length of 34 inches and are 1 3-4 inch wide, and the rear spring measures 46 by 2 inches.

Cowl Gasoline Tank Retained

The new 32 retains its gasoline tank under the cowl. Its method of mounting and general shape are unaltered, but the capacity has been increased 3 gallons, making the total 11.5 or enough fuel for 200 miles of ordinary running, it is stated.

The bodies are of the same design as have been used heretofore with minor refinements.

Some of the in-built equipment has been changed on the new cars also. The top is 2 inches higher and has other small detailed improvements. The windshield is of the rain-vision, ventilating type, hinging at two points. Demountable rims are regular equipment, one extra being furnished and mounted on an improved carrier at the rear. This carrier is really a dummy rim to which the demountable part clamps just as it would on a wheel. This prevents chafing of the tires and eliminates the use of straps. Tires are 33 by 4 inches.

The four-passenger touring car and the roadster are listed at $1,200, with cranking and lighting equipment and demountable rims, and they may also be had without these features for $1,050, an increase of $50 over last year's models similarly equipped. The six-passenger car with this new equipment is listed at $1,300, its $1,200 price still holding when not so equipped. The coupé is furnished only with the electric equipment and is priced at $1,350.

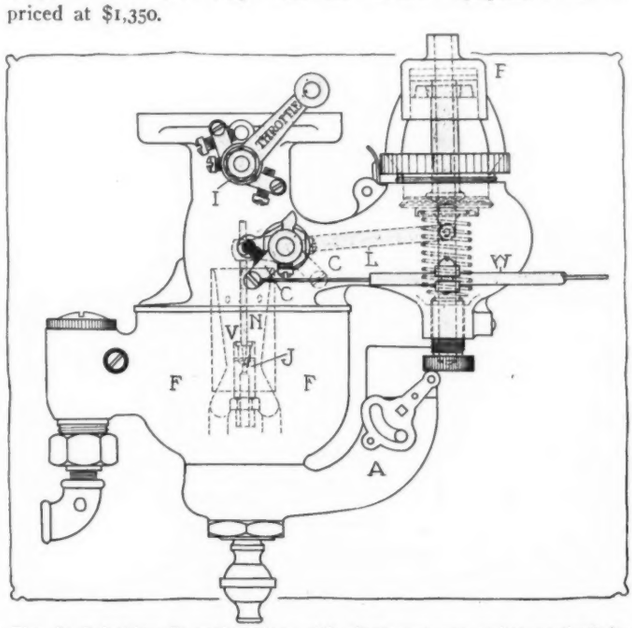

Fig. 2—Schebler R carbureter with dash pot air valve control to prevent fluttering

POOR GAS IS PASSING AWAY

GIVE HIM ANOTHER WRITE UP!
GIVE HIM SOME OF HIS OWN GAS SO HE CAN DIE EASY !!
HE HAS ELECTROLITUS. VERY DANGEROUS !
MY GAS VALVE LEAKS !!
HE HAS TOO MUCH LOST PRESTIGE. GIVE HIM MORE PUBLICITY !!
PUBLICITY
WRITE UPS
EXAGG-ERATIONS
MISSTATE-MENTS

Trying to Keep a Dead One Alive

ELECTRIC LIGHTING NEEDS NO DOCTOR

It is healthy and strong and will live forever

EVEN IF GAS WERE CHEAPER

It would not do in this up-to-date age

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Over 200,000 Cars Tell the Story

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Depots in all Principal Cities in the United States, Canada and Mexico

40

SCUDDER Gas Saver—Fig. 1 shows at the bottom an automobile gasoline saver handled by the Automobile & Accessories Co., 1926 Broadway, New York City. The Scudder gasoline saver, it is claimed, will reduce the gasoline consumption 20 to 25 per cent. because it introduces air into the manifold, thus retarding the gasoline flow from the carbureter, making a rarer mixture for combustion. It is a brass cup-shaped outer casing containing a seated valve with the necessary springs, and is attached to the intake manifold. This valve is manually operated through a flexible cable attached to the gas saver. The seat of operation is centered in a friction lever attached to the dash or other convenient place, as shown at the lower right of the illustration. It is installed by unhooking the carbureter from the intake pipe and dumping the former slightly and then placing a piece of cardboard or metal over the opening so that shavings will not fall into the carbureter. After drilling a 44-inch hole about 3 inches above the carbureter, and cutting a thread in the hole with a .5-inch, 27-thread tap, the instrument can be screwed into the manifold. The flexible cable, which comes with the saver, should be run in as direct a line as possible to a point on the body of the car most convenient for the operator to handle, and after attaching it is ready for operation. Any slack in the flexible cable will not affect the operation of the saver.

Schiller Pocket Lighter—The Schiller Mfg. Co., Chicago, Ill., manufactures a pocket lighter which can be attached to the pocket by means of a safety clip. This lighter is 4 inches in length and has a diameter of .31 inch. It weighs 1 ounce. The receptacle or tube shown at the top, Fig. 2, is made of seamless brass tubing heavily nickel-plated, and either alcohol, benzine or gasoline may be used. The wick G is a wire-mounted, odorless, fireproof substance; at the lower end of the receptacle or tube is a file A made of tempered steel; at the top is a solid brass plunger F, the length of a match, at the lower end of which is a piece of what the company calls Pyrofor, capable of 5,000 ignitions, which strikes like a match. When the plunger is inserted a spring C, with a cap D and sponge E is compressed, thus forcing the fluid above the sponge and keeping the wick saturated; the shoulder is tapered, hermetically sealing the receptacle or tube, but the knurl makes it possible to easily and quickly remove it.

Paragon Gasoline and Oil Separator—A recent extract from regulations of the New York City explosives commission states that no garage permit authorizing the storage of volatile inflammable oil shall be issued for any premises which are not provided with an oil separator, trap or other similar apparatus attached to the house drain for the purpose of preventing volatile inflammable oils from flowing into the sewer. This ordinance has brought out the Paragon separator, Fig. 3, made by the Ansonia Mfg. Co., 30 Church street, New York City, designed to meet the requirements of the Fire and Building Departments. The best position for this separator is near the sidewalk and under the floor with the hand pump shown in the illustration projecting through the floor. The principle is as follows: the waste water containing gasoline and oil enters the branch floor drain shown at the lower right of the illustration, and flows into a sand box, where all solids are extracted. From here it flows through a screen into a U-shaped container and thence out through a discharge into the street sewer. Inside this U-shaped container is the cylindrical oil chamber where the gasoline and oil are collected. Since they are both lighter than water, they will rise above the water and enter the oil chamber through an opening at the back of the cylinder. There is a hand pump for drawing out the oil and gasoline and an indicator with a ball float, showing the level of both. The same principle employed in the U-shaped tank is used at the branch floor drain by the installation of two air vents. There is one which runs to the roof, this taking out the impure air, while the other one, running to the sidewalk, lets in fresh air, which is heavier than the impure, thus driving it out. The sand box is placed in a convenient place so as to afford easy access when new sand is needed. There is a relief pipe in the U-shaped container and one also in the oil chamber.

E-Z Polishing Cloth—A cloth ready for cleaning and polishing brass, copper and steel is being marketed by Ralph Waldt, 1682 Broadway, New York City. This cloth alone does the work. It contains no acid, according to the maker. The luster after polishing will last a long time, as an imperceptible covering of oil is left, which turns away the drops of rain.

Norton Blowout Patch—A new blowout patch, made entirely of metal and different from anything now on the market, has been invented and patented by J. W. Norton, Prescott, Ariz. The new patch consists of three metal disks which are fastened together with a bolt that has the ends countersunk so that the disks are flat and smooth on the outer surfaces. Each disk is about 4 inches long, 2.5 inches wide and 1/16 inch thick. They are elliptical in shape. In the event of a blowout the smooth disk is placed inside the torn tube and another disk, conforming in shape to the first one but with protruding teeth on its outer surface, is bolted to the inner disk. Two canvas gaskets are used to insure an airtight fit. The tube is then placed in the casing and the bolt thrust through the blowout. The last disk is then laid over the casing and the three are fastened with a flush bolt and nut. The protruding teeth on the middle disk serve to keep the casing and tube together. A Kansas City firm is manufacturing Norton's patch, which is called the Staso.

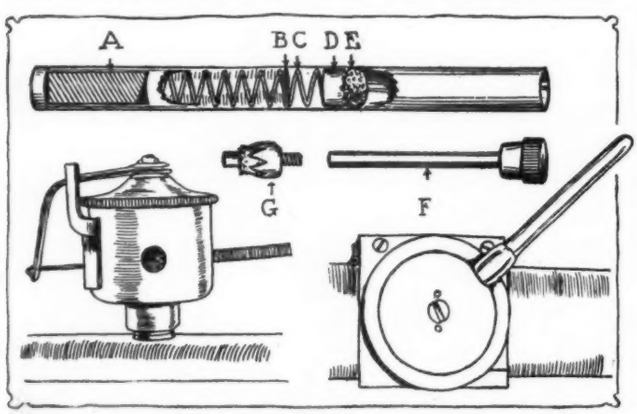

Fig. 1—At bottom of cut—Left, Scudder gas saver as attached to intake manifold. Right, friction control lever for Scudder gas saver. This is to be attached to the dash or come other convenient place. Fig. 2—Top of cut—Schiller pocket lighter for lighting lamps, cigars, etc.

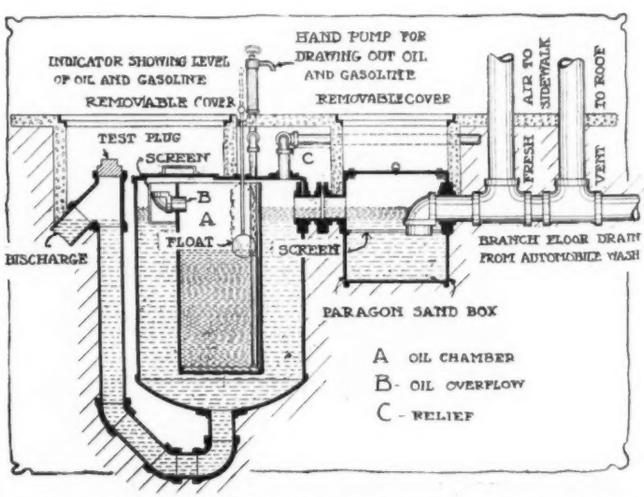

Fig. 3—Sectional view, showing installment of Paragon gasoline and oil separator designed to meet the demand for a device preventing the flow of gasoline and oil from garage floors, wash racks, etc., into city sewers